

Economic Evaluation for Riverside Landscape Design
Considering Amenity and Disaster Mitigation:
a Case Study for Yogyakarta City, Indonesia

Atrida Hadiani

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Economic Evaluation for Riverside Landscape Design
Considering Amenity and Disaster Mitigation:
a Case Study for Yogyakarta City, Indonesia

ATRIDA HADIANTI

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Abstract

Riverside in urban area in Indonesia is typically utilized as high-density settlements. This area is supposed to be functioned as conservation area for natural ecosystem that helps to control floods. In Yogyakarta City, riverside area is highly exposed not only to river flood but also cold-lava flood. General purpose of this research is aim to investigate the importance of knowledge in building people's perception toward a design of public facility. A scenario of redevelopment and a conceptual design for improving the riverside landscape is shown to be examined using contingent valuation method (CVM), in which the value of impression is converted into value of money. CVM is executed in 2 (two) stages: 1) first, amenity valuation, 2) second, safety valuation. There are 3 CVM tests are executed using 2-stage CVM with reversed order of explanation. As a result, 2-stage CVM causes changes in WTP due to the way in carrying information and the order of explanation cause the different total WTP. Function aspect is valued higher than amenity aspect. Income and education is significantly influencing WTP. Significant changes of WTP following the additional explanation of the design indicated that the knowledge of the design influence the value. Therefore, in order to increase benefit, it is important to provide more knowledge. Policy maker should consider WTP estimation results as the amount of WTP implies that there is need of redevelopment of riverside area in Yogyakarta City. It is necessary to integrate and prioritize programs that could increase knowledge into the planning process to increase benefit of the development.

Keywords: riverside landscape design, contingent valuation method, economic evaluation, amenity, disaster mitigation

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Table of Contents

Abstract	iii
Acknowledgements	iv
Table of Contents	vi
List of Tables	vii
List of Figures	viii
1. Introduction	1
1.1 Background	1
1.2 Research objectives	3
1.3 Research content	4
Reference	5
2. Disaster risk in riverside area	7
2.1 Profile of Yogyakarta City	7
2.2 Threats and impacts	10
2.3 Coping strategies and adaptation	19
Reference	21
3. Riverside open space design	23
3.1 Amenity	23
3.2 Disaster mitigation	26
3.3 Conceptual design of riverside landscape	27
Reference	32
4. Economic evaluation for riverside landscape design	33
4.1 Methodology	33
4.2 Characteristics of respondents	46
4.3 Estimation of willingness to pay	56
4.4 Comparison of willingness to pay	62
4.5 Factors influencing willingness to pay response	74
Reference	80
5. Discussions	82
5.1 Influence of knowledge to valuation	82
5.2 WTP determinant	86
Reference	88
6. Conclusion and recommendation	90
Annex	92

List of Tables

Table	Title	
2-1	Open space of Yogyakarta City	9
4-1	Economic valuation methods	35
4-2	Types of questionnaire	40
4-3	Bid values	42
4-4	Sampling of the survey	44
4-5	Number of respondents per subdistrict	46
4-6	Age, sex and marital status of the respondents	47
4-7	Education, occupation and income of the respondents	48
4-8	Household size, income person in household, house ownership and living duration of the respondents	51
4-9	Attitude towards the riverside	53
4-10	Flood experience and flood estimation of the respondents	54
4-11	Image and explanation of Type A	57
4-12	Willingness to Pay of Questionnaire Type A	57
4-13	Image and explanation of Type B	59
4-14	Willingness to Pay of Questionnaire Type B	59
4-15	Image and explanation of Type C	61
4-16	Willingness to Pay of Questionnaire Type C	61
4-17	Image and explanation of Type A and B	63
4-18	Image and explanation of Type B and C	66
4-19	Image and explanation of Type A and C	69
4-20	Image and order of explanation in the questionnaire	72
4-21	Correlation of reasons of WTP response to WTP	78
4-22	Correlation of socio-demographic variables to WTP	79
4-23	Correlation of attitudinal variables to WTP	79
5-1	Result of WTP estimation (in IDR)	83

List of Figures

Figure	Title	
2-1	Geographical location of Yogyakarta City	7
2-2	Population of Yogyakarta City in each subdistrict	8
2-3	Land use of Yogyakarta City	8
2-4	Earth imagery of Yogyakarta City	9
2-5	Vulnerability as function of the degree of exposure and capacity	11
2-6	Flooding in Winongo River 2016	12
2-7	Orthoimage (a) and sketch map (b) of the Suryatmajan suburb in Yogyakarta city, showing the comprehensive hazard microzonation and risk assessment of lahar-prone areas (scale 1/2000)	14
2-8	River system of Mt. Merapi	15
2-9	Number of lahar occurrence and related cumulative damages	16
2-10	Lahar flood extent in 2011 event	17
2-11	Landslide event in Code River	18
2-12	Water level mark on the levee as monitoring and early warning	19
2-13	Dike construction scheme	20
2-14	Heightened floodwall	20
3-1	Riverside promenade of Kamo River, Kyoto	23
3-2	Lantern festival in Cheonggyecheon River in Seoul, South Korea (left) and summer festival in Kamo River in Kyoto, Japan (right)	24
3-3	Supporting elements of riverside landscape, bridge (left) and water fountain (right)	25
3-4	Existing condition of riverside area in Yogyakarta City	27
3-5	Modified visual image of existing condition	29
3-6	Conceptual design with amenity	30
3-7	Conceptual design with disaster mitigation function	31
4-1	Efficient distributions of resources through CBA	33
4-2	Types of economic values	34
4-3	Illustration of CVM measure	37
4-4	Value of environment to quantity	38
4-5	Application of DBDC elicitation method	41
4-6	Survey assistant conducting interview survey	43
4-7	Data input for calculation using CVM 4.0	45
4-8	Distribution of sex (left) and marital status (right) of the respondents	47
4-9	Distribution of education of the respondents	49
4-10	Distribution of occupation of the respondents	49
4-11	Distribution of household income of the respondents	50
4-12	Household size and income person in household of the respondents	50
4-13	Distribution of house ownership (left) and living duration (right) of the respondents	52
4-14	Distribution of closest river (left) and distance to river (right) of the respondents	53
4-15	Distribution of the respondents' experience of flood disaster	54

4-16	Distribution of the respondents' estimation of flood disaster	55
4-17	Impressions of proposed design	55
4-18	Percentage of willingness to pay (WTP) Questionnaire Type A	58
4-19	Percentage of willingness to pay (WTP) Questionnaire Type B	60
4-20	Percentage of willingness to pay (WTP) Questionnaire Type C	62
4-21	Mean WTP of Type A and B	64
4-22	Median WTP of Type A and B	65
4-23	Mean WTP of Type B and C	67
4-24	Median WTP of Type B and C	68
4-25	Mean WTP of Type A and C	70
4-26	Median WTP of Type A and C	71
4-27	Mean WTP of Type A, B, and C	73
4-28	Median WTP of Type A, B, and C	74
4-29	Reason of WTP response of Type A questionnaire	76
4-30	Reason of WTP response of Type B questionnaire	76
4-31	Reason of WTP response of Type C questionnaire	77
5-1	Activities of river-concerned CBO; 'river school' as public lecture platform (left) and ' <i>merti kali</i> ' as cultural approach for raising awareness toward the river (right)	84

Chapter 1

Introduction

1.1. Background

Yogyakarta has 3 main rivers that flow crossing the city, namely Winongo, Code and Gajahwong. Both rivers are headed in Mount Merapi, an active volcano. In the eruption event, Merapi volcano produces large number of sediment volumes during the eruption period, which potentially transport to downstream in various mechanisms, among others through natural flow by bed transports and debris flows (Wardoyo et al, 2010). This debris flows is known as cold lava flood or “*banjir lahar dingin*” in Indonesian language. The risk of cold lava flow is mainly threatened residents who live along the riverside, because the flow of cold lava can flooded neighborhoods, destroyed houses and buried all in the sand.

There are several flooding events recorded in rivers in Yogyakarta due to debris flow within the last 25 years. The last Merapi eruption event in 2010 leads to massive sediment flow that cause flooding in some riverbank and inundated more than 300 houses. Water and debris inundated the settlements 50 meter from the riverbank with depth of 1.25 meter, this event caused 800 residents evacuated (Harian Kompas, 2011).

Considering the risks above, with the aim of protecting the community from disasters and enhance the environment quality in the riverside, the redevelopment is needed. However, in designing the riverside area beside natural conditions, considering socio-cultural conditions also should be taken. Involving the community into planning process could provide the information about what aspect of the design that they actually need, and give benefits to their livelihood, economically and environmentally. By such approach, the design could be more comprehensive and accepted. Therefore, it would be easier to implement the design and, furthermore, maintaining the sustainability.

High density residential is currently resides the riverbanks in urban areas, and the community who reside this area is mostly low-income community. This community is highly exposed to disaster risk, not only river floods but also lahar floods. In the other hand, the dense settlement in the riverside area caused various environmental problems, among others garbage and domestic waste. Moreover, green open space in the area is very few, whereas the riverside area should be a conservation area to preserve the natural ecosystem of the river.

Several attempts to redevelop the riverside area, particularly in Yogyakarta City, were done in the previous research. Maryono (2005) identified the degradation of ecology in urban riverside, then proposed river restoration in order to bring back the river functions as natural habitat, therefore it is need to revitalize the existing ecological components. In addition, (Soemardiono and Gusma, 2014) is more concerned in sustainability, in which integrating ecological, economic and social aspect through public participation. Furthermore, regarding the dense settlement along the riverside, relocation to flat housing becomes one solution to solve the problem. Bawono and Astuti (2011) calculated the number of buildings needed to meet the capacity to convert the horizontal settlements into vertical housings.

Disaster threats also become most concern towards riverside area, particularly cold lava flood (Lavigne et al, 2000; Wardoyo et al, 2010; Bélizal et al, 2013). Sukoco (2013) identified the extent of inundation in the settlement, while Heryanti (2012) explored the coping capacity of riverside community in addressing the flood hazard. In attempt to mitigate the impact of cold lava flow, Fathani and Legono (2012) introduced a collaborative-based monitoring and early warning system. In the other hand, local people has constructed riverside dike by mobilizing their resources (Setiawan, 2002). However, to ensure safety against flooding, not exclusively cold lava flood, Sulistiono (2011) recommend to widening the floodplain.

By considering experiences and recommendations from the previous researches, this study is attempted to propose a concept of riverside landscape design that integrates amenity and disaster mitigation. The design is not only enhance the amenity aspect but also the function aspect, in which improvement of aesthetic and enjoyment is complemented with disaster mitigation function. Therefore, the design concept developed in this study could contribute to solve riverside area problems in Yogyakarta City specifically or other riverside area that facing the similar problem in general.

Redevelopment of a public facility requires integrating public participation into the process. However, people's willingness to participate into the redevelopment process is relying on their interest to the project, which is related to the value of the public facility. As a public good, valuation of the public facility is needed, since people do not purchase for public goods directly. Like most traded goods, the valuation of the goods is not only influenced by the mere impression, but also because of the individual's knowledge of the goods. Information is necessary to provide knowledge to the user about the goods.

This study aims to estimate the value of the design of riverside area. To meet the objective, contingent valuation method (CVM) used for valuation of the proposed design of riverside area. The value of impression towards the proposed design is converted into the value of money. This concept refers to the amount that people willing to pay to get the merits of specific services or willingness to endure welfare loss from a reduced provision of services (Mitchell and Carson, 1989; Garrod et al., 1996). CVM is widely applied in economic evaluation of public goods, includes environment and infrastructure. Related researches applied CVM were done in public parks and green spaces (Ahmed and Gotoh, 2006; del Saz Salazar and García Menéndez, 2007; Song et al, 2015; Latinopoulos, 2016; Verbič et al, 2016) and focusing in recreational benefits (Jim and Chen 2005; Oh et al 2008; Tuan et al, 2014). Meanwhile, riverside landscape design, particularly, were evaluated by Bae (2011) using conjoint analysis determined the value of natural and recreational attribute.

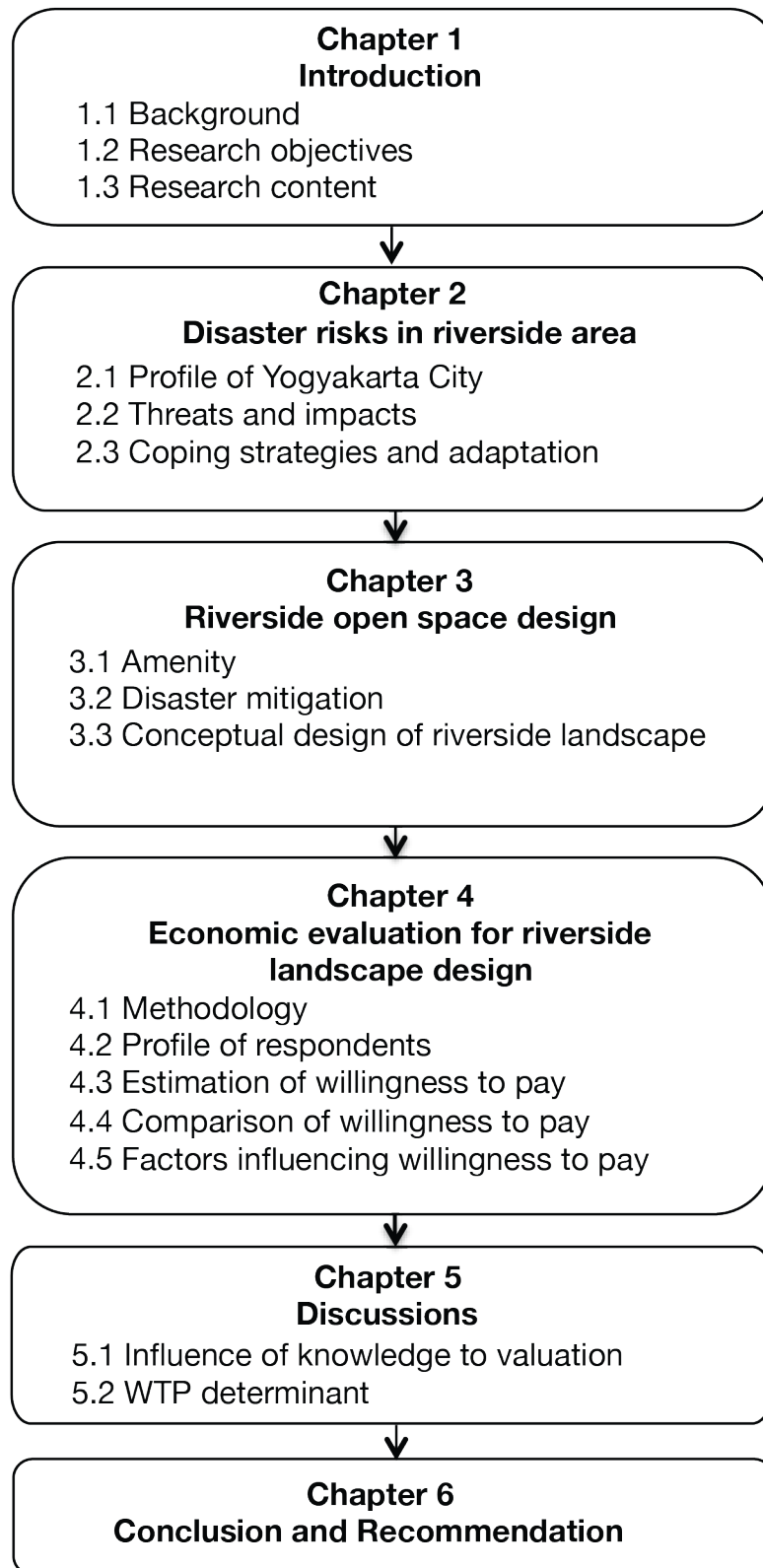
General purpose of this research is aim to investigate the importance of knowledge in building people's perception toward a design of public facility. Some studies reveal that there is positive correlation between education and value of public goods, in this term, willingness to pay (Brunson and Reiter, 1996; Jim and Chen, 2005; Lee and Yoo, 2016; Latinopoulos, 2016). However, like most of CVM studies, it does not explain the way the knowledge is influencing the valuation. Hence, this study applied CVM in two-stage to analyze the influence of knowledge to the valuation. The results of this study provide significant indication of the economical benefit of the riverside landscape design and the importance of knowledge in building value of a public facility. Therefore, this research is important in attempt to solve current problems of urban riverside area, significantly in addressing disaster risk. Moreover, this research will provide information for consideration to construct not only riverside facility, but also for other public facilities.

1.2. Research objectives

The objectives of this research are:

- 1) review disaster risks of the study area, in term of threats, impacts, and coping strategies,
- 2) generate conceptual design of riverside area with amenity and safety approaches,
- 3) analyze community willingness to pay of the proposed design in amenity and safety aspect and identify factors influencing willingness to pay and
- 4) analyze the influence of knowledge to the valuation.

1.3. Research content



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Chapter 2

Disaster Risks in Study Area

2.1. Profile of Yogyakarta City

Yogyakarta City is a capital of Special Region of Yogyakarta Province located in between 110°24'19"-110°28'53" east longitude and between 07°49'26"-07°15'24" south latitude. The city lies within an area of 32.5 km² or 1.025% from the area of Special Region Yogyakarta Province in 114 meters above sea level in average. The area is divided into 14 subdistricts. Population of the city is 407,904 (in 2014) and population density reached 13,177/km².

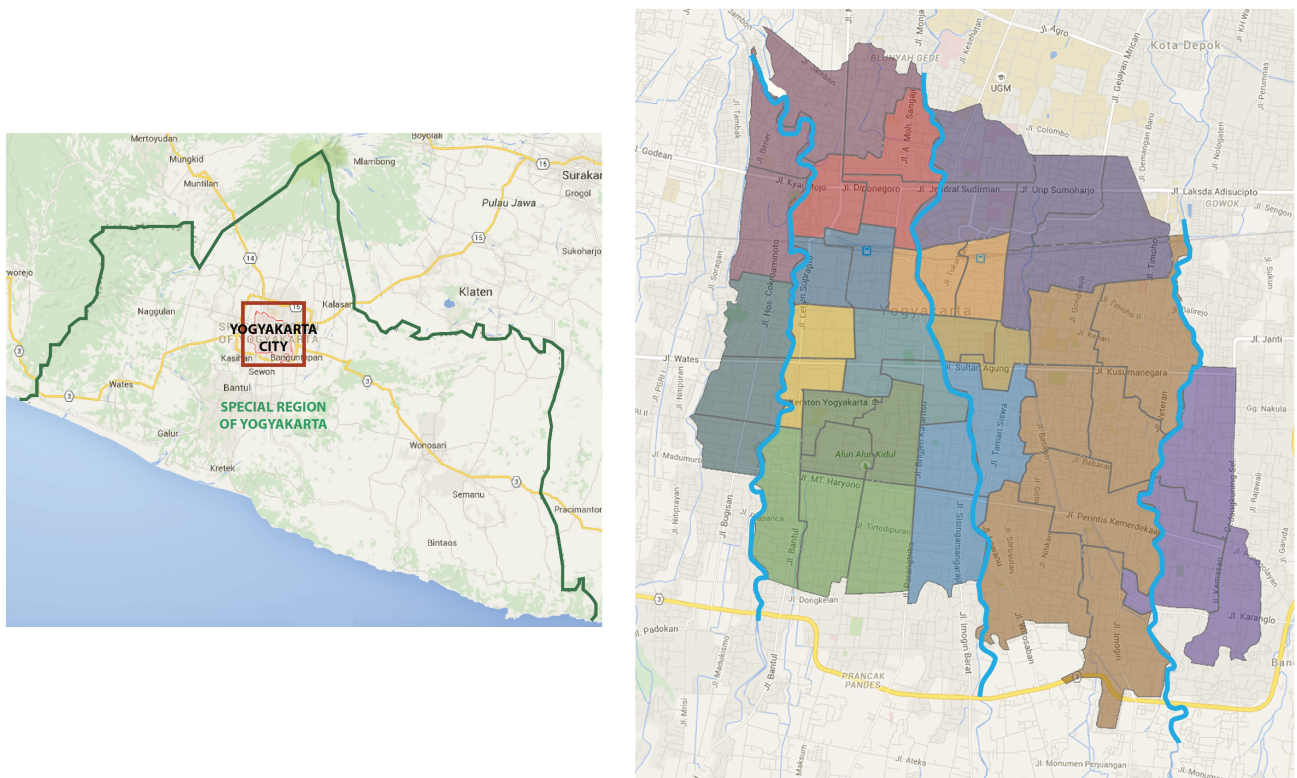


Figure 2-1 Geographical location of Yogyakarta City

Source: Google Maps

Yogyakarta City is famous as center of culture because the *Kraton* Yogyakarta (Kingdom of Yogyakarta) is still exist and ruling as provincial government. In 2012, Law Number 13/2012 sets Yogyakarta Special Region as 'special region', which means provincial leadership held by the king who ruled at *Kraton* Yogyakarta. Through this law,

Yogyakarta Special region is designated for center of cultural activities along with the subsidy for special region.

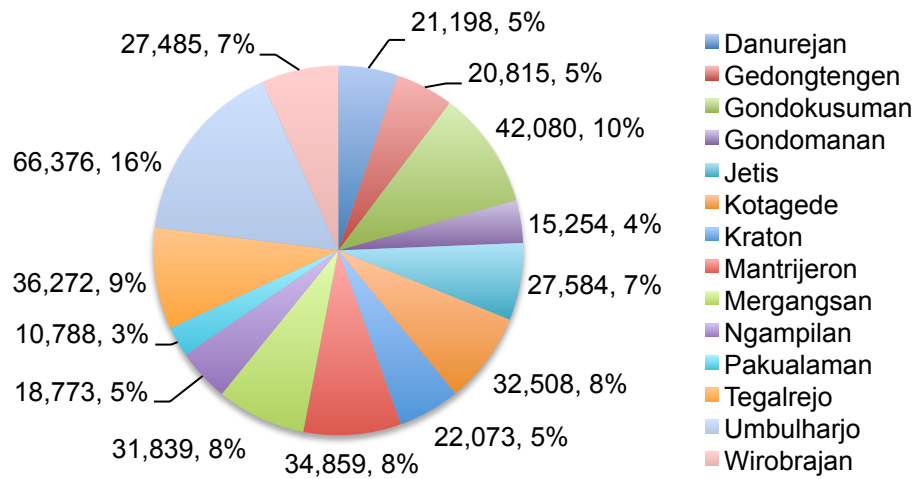


Figure 2-2 Population of Yogyakarta City in each subdistrict

Source: Demography Bureau of Yogyakarta Special Region

As a capital city of the province, Yogyakarta City is become center of activity, thus it encouraged urbanization to the city. As a result, among the total area of Yogyakarta City, the land is significantly used as residential area, following with service and business (see Figure 2-3). Therefore, most of the land cover is built and there are a few of open space (see Figure 2-4).

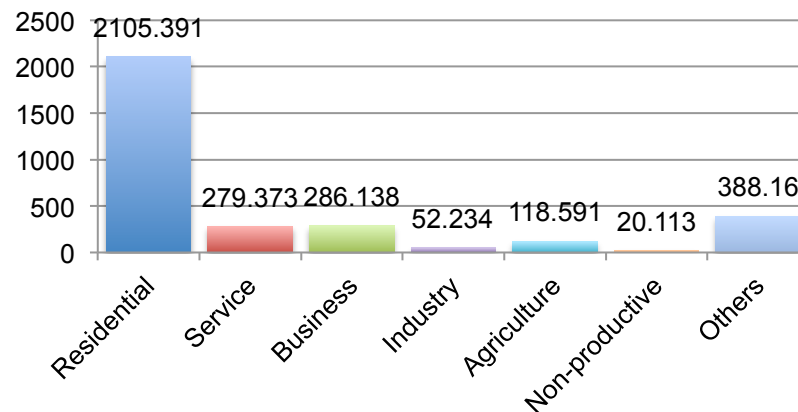


Figure 2-3 Land use of Yogyakarta City

Source: District Regulation of Yogyakarta City Number 7/2012

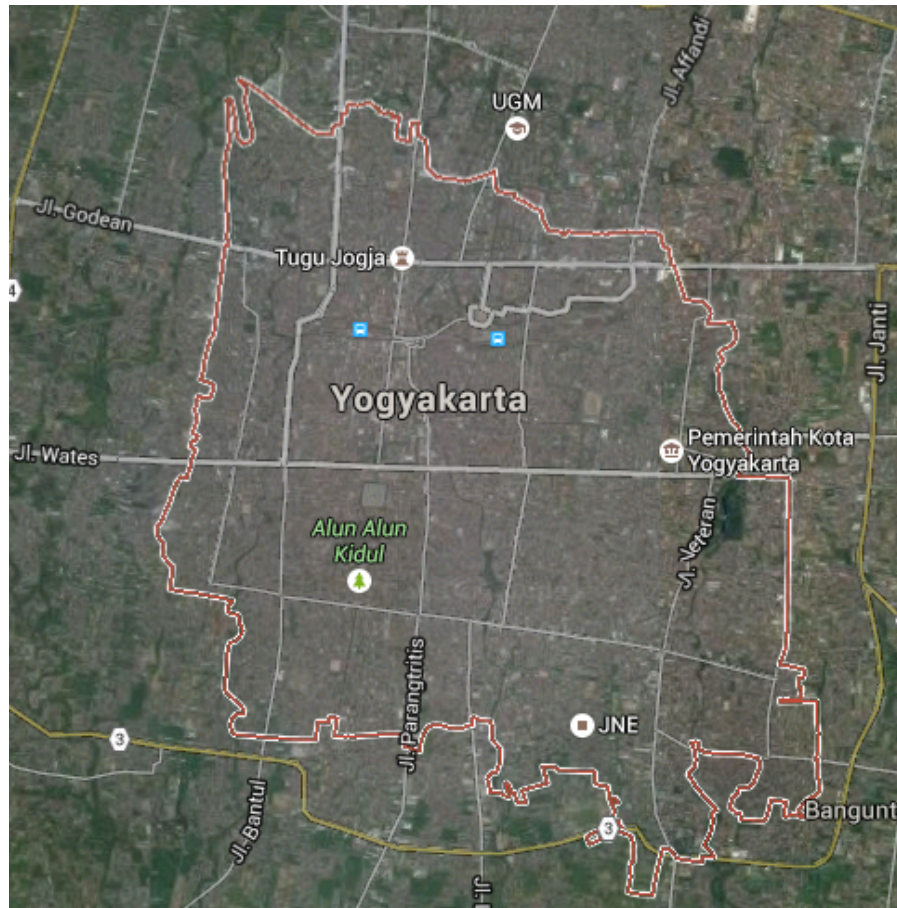


Figure 2-4 Earth imagery of Yogyakarta City

Source: Google Maps

Table 2-1 Open space of Yogyakarta City

Year	Green Space (m ²)	Trees	Area (%)
2007	56,000	4,287	26,80
2008	56,000	4,708	26,80
2009	56,862	5,058	31,65
2010	60,659	8,158	31,99
2011	62,305	10,34	32,86

Source: District Regulation of Yogyakarta City Number 7/2012

Table 2-1 depicts that there is increasing open space in Yogyakarta City from year to year. Indonesian government regulates the open space through Law Number 26/2007 on Land Use Planning, stated that a city presupposed having at least 30% of the total area for green open space. Regarding this matter, open space in Yogyakarta City is currently meeting

the ideal area of open space. Therefore, the need to increase open space is not significantly to meet the requirement, but more on natural protection.

There are three rivers flowing across the city, i.e., Gajahwong River in the east, Code River in the middle and Winongo River in the west part of the city. All the rivers are originally flows from Mount Merapi in the north of Yogyakarta City. Mount Merapi is an active stratovolcano, which produces large number of sediment volumes that potentially carried to downstream through the rivers (Wardoyo et al, 2010). Therefore, the city is facing the risk of volcanic materials and debris flow due to the volcanic activities. Moreover, not only following the eruption event but also high precipitation, since the city is located in the valley, the water flows down transporting water and debris to the city (Lavigne et al, 2000). The dense settlements grew alongside the rivers in Yogyakarta City exposed the residents to disaster risks in the riverside, namely floods and landslide. Therefore comprehensive planning of the riverside is needed not only to enhance amenities but also mitigate the potential risks.

2.2. Threats and impacts

Refers to ISO/IEC Guide 73, the term “risk” is defined as chance or possibility of threat and its potential losses for some particular cause, place and period. Meanwhile, UNISDR (2004) measures the risk in a function of hazard, vulnerability and capacity of a population exposed to the hazard, as formulated below:

$$\text{Risk} = \frac{\text{Hazard} \times \text{Vulnerability}}{\text{Capacity}}$$

Source: UNISDR (2004)

Peterson and Tilling (2000) elaborated that risks are a measure of the adverse effects of a hazard that is including damage to property, loss of productive capacity, and loss of life as a result of hazardous processes. Hazard is potentially dangerous phenomena that might occur in the foreseeable future in the area under consideration (Newhall,2000). Vulnerability is the susceptibility of people, property, and economic activity to be affected by the volcano hazard (De La Cruz-Reyna et al., 2000). Then, capacity is the ability of the community to prepare and respond to the hazard. The higher exposure of the community to hazard, and low capacity to cope with the hazard risks, the community becomes more vulnerable to the risk (see Figure 2-5). Hence, communities must be able to identify their exposure to hazard impacts to proactively address emergency planning, response, and recovery and implement

hazard mitigation measures. The importance of understanding risk is to become the fundamental to enhancing resilience (USAID, 2007).

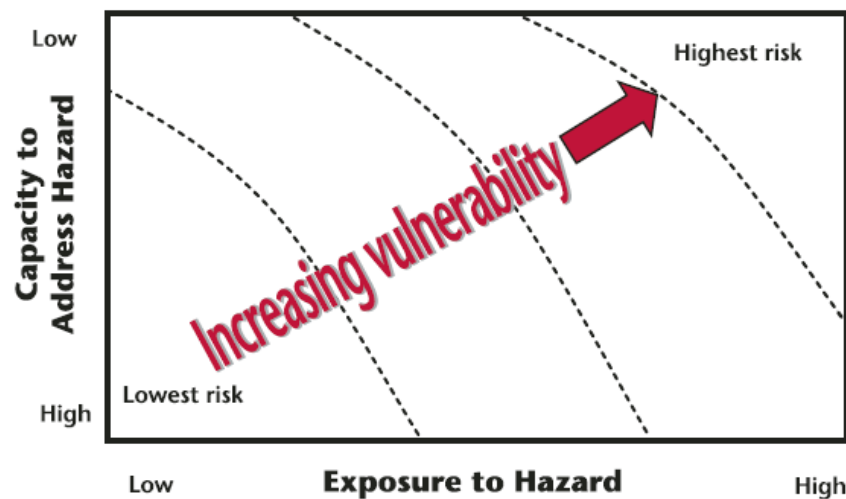


Figure 2-5 Vulnerability as function of the degree of exposure and capacity

Source: USAID (2007)

In this study, there are three disaster there was found in the study area; riverine flood, cold lava flood and landslide. Major threat of the riverside area is flood disaster, considering the river water dynamics. Flood is defined by SAARC (2005) as high-water stages in which water over flows its natural or artificial banks onto normally dry land, such as a river inundating its floodplain. There are two types of flood that frequently occurred in the study area, namely riverine flood and cold lava flood. In addition, landslide also occurred and affects the settlements along the riverside.

2.2.1. Riverine flood

According to ADPC (2005), a riverine flood is occurring when major rivers and their side channels overflow, causing extensive inundation. FEMA explained that the prolonged rainfall in the upstream usually causes flooding. Riverside areas as a floodplain are prone to flooding, and the dense settlement along the riverside in urban area is barely exposed to flood hazard.

Riverine floods consist of two types of river flooding:

- 1) Slow-onset floods. Occurs slowly and causes may consist of snowmelt and steady ongoing rainfall. This can happen in a long period (for weeks or months). Rising water level is predictable, giving people a chance to evacuate themselves.
- 2) Rapid onset/flash floods. Occurs mainly in steep rivers with small and steep mountainous catchments after periods of intense rainfall. A rapid rise and fall of water level with little or no advance warning.

Riverine flood in Yogyakarta City is usually occurred annually during rainy season, when there is high precipitation in the upstream. However, extreme flooding event is relatively infrequent, and losses due to flood is very low. Due to the topographical condition, rivers in Yogyakarta City is influenced by the volcanic activity of Mount Merapi, in which eventhough the riverine flood is triggered high precipitation, there is high possibility that it may carries volcanic materials and debris that leads to cold lava flood.

In March 2016, there was flood occurrence in Winongo River, the largest event after the 1984 flood (Liputan 6, 2016). The flood event was ‘suddenly’ occurred since it was not raining in the downstream, nonetheless it is there was high rainfall happened in the upstream. The flood event cause inundation in several village alongside Winongo River, it is reported that there is three houses collapsed, one bridge damaged, and 1,700 people evacuated (Tempo, 2016). However, this event is not carrying any volcanic materials, therefore it was a purely rapid onset riverine flood event.



Figure 2-6 Flooding in Winongo River 2016

Source: krjogja.com, tribunnews.com

2.2.2. Cold lava flood

Beside the river flooding there is a specific type of floods is frequently occur in the study area, which is called '*lahar*' (lava) flood. Lahar becomes one of the most important hazard at Merapi volcano and surrounding areas regarding the eruption that used to occur every 4-6 years during 20th century until 2006 (Bélizal et al, 2013). In the event of eruption, pyroclastic flows not only in the form of heated clouds and flowing hot lava. As one of the most active volcanoes in the world, Mount Merapi also produces lava deposit sources. Merapi volcano produces large number of sediment volumes during the eruption period which potentially transport to downstream in various mechanisms, such as through natural flow by bed transports and debris flows, and flows through human-related activities by sand mining (Wardoyo et al, 2010). Produced deposits of lava eruptions from the previous eruptions occurred are capable to cover 286 km² on the flanks and the surrounding piedmonts of the volcano. The lava flow can occur triggered by rain, which is when rainfall is high during the rainy season, normally from November to April. These lava flows can reach speed between 5-7 m/s at 1000 meter in elevation. A wide range of facies may be generated from a single flow, which may transform down valley from debris flow to hyperconcentrated stream flow (Lavigne et al, 2000). This kind of lava flows is known as cold lava flood or "*banjir lahar dingin*" in Indonesian language.

Cold lava flood has a high hazard potential due to the speed of flow and materials that carried together with the flow. Cold lava flow is composed of thick sedimentary rocks, gravel, sand and volcanic ash mixed with water. Supported by the flow of water and the steep slopes, cold lava flow has a very powerful energy that able to destroy anything in its path. Then it goes through a process of sedimentation of volcanic material and settles on the rivers of its path. The risk of cold lava flow is mainly threatened residents who live along the riverside, because the flow of cold lava can flooded neighborhoods, destroyed houses and buried all in the sand. Due to their potential to be re-channeled into the adjacent river valleys and sometimes to flow laterally away from the main channel confines, they are considered the most hazardous part of the block-and-ash flows. Damages caused by lahar is related to its morphogenic process, according to Bélizal et al (2013) there are avulsion, riverbank erosion and corridor widening and overflow (see Table.). That leads to the conditions during flow emplacement their development must be taken into account for guiding future pyroclastic-flow hazard assessment at Merapi (Charbonnier, 2008).

During and after the eruption event, rivers that tipped from Mt. Merapi may carry considerable amount of sediment generated by the volcano and flows with destructive power, among of those rivers Boyong/Code River and Kuning River (in east part of Yogyakarta) have higher potential to get struck by debris flow (Legono, 2006). In 1994, due to the eruption event, lahars were formed in Boyong/Code river carries volcanic materials approximately $2.5 \times 10^6 \text{ m}^3$ (Lavigne, 2000) struck the upstream part of the river severely (Fathani and Legono, 2012) and cut across Yogyakarta. About 13,000 people at risk along the river, where population density exceeds $5,600/\text{km}^2$ (Lavigne, 2000). Later, during 1994 thru 1996, the cold lava flood event at Boyong/Code River occurred more frequent rather than that occurred at Kuning River. In order to protect Yogyakarta City from debris flow disaster, 41 Sabo dams were built along Boyong/Code River equipped with river training structures such as groundsills and retaining walls (Fathani and Legono, 2012).



Figure 2-7 Orthoimage (a) and sketch map (b) of the Suryatmajan suburb in Yogyakarta city, showing the comprehensive hazard microzonation and risk assessment of lahar-prone areas (scale 1/2000) (Lavigne, 2000)

In 2006 Mt. Merapi eruption event (April to October 2006), the volcano produced approximately 8 million m³ of sediment that is potentially travel to downstream towards the southern part of the mountain (Legono et al, 2008). Lahar and debris flowed towards Gendol River (east of Boyong/Code River) reaches a distance of 15 kilometers from the summit. This event caused 2 people and 7 trucks be caught in a snare, damaged 1 bridge, cut off roads and induced cracking in the cliff Gendol River (in the north of Kaliadem) along approximately 15 meters (Mananoma and Legono, 2007).

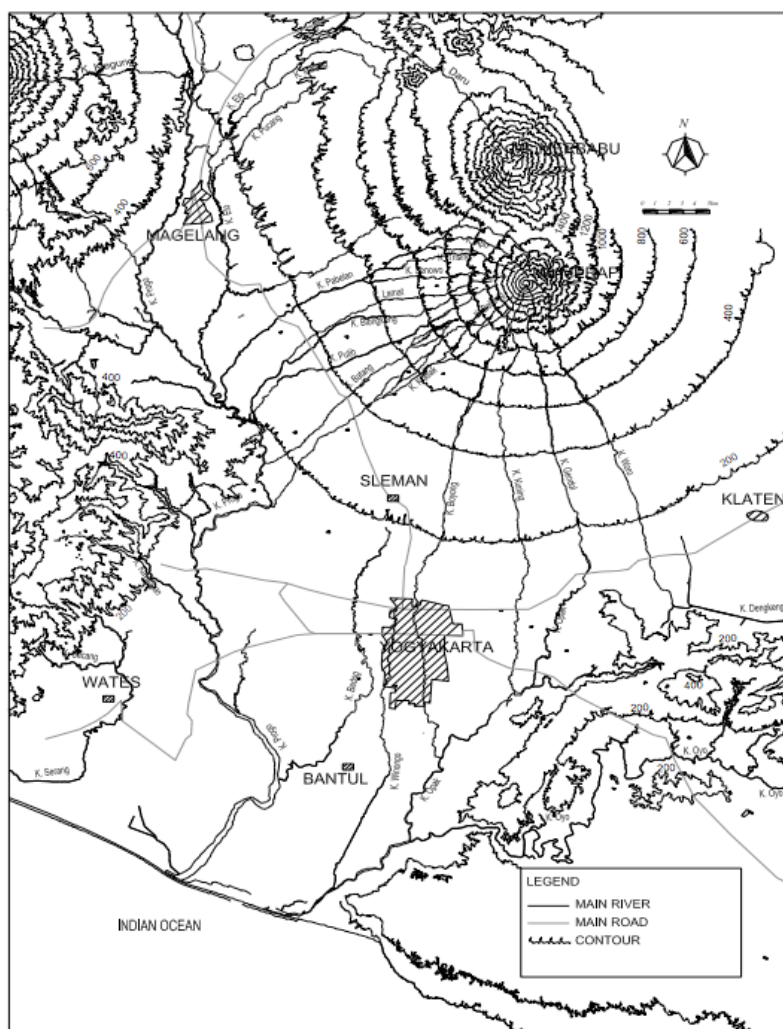


Figure 2-8 River system of Mt. Merapi (Mananoma and Legono, 2007)

The 2010 Mt. Merapi eruption was also lead to several cold lava flood in rivers that flow originated from Mt. Merapi, Boyong/Code River and Putih River (in the west flank of Mt. Merapi) had more frequent occurrence than the other rivers. There is approximately 140 million m³ of pyroclastic deposits produced by the volcano, and more than 10 million m³ deposits are potential to move downstream through Boyong/Code River passing Yogyakarta

City (Fathani and Legono, 2012). Bélizal et al (2013) recorded that there were over 240 lahar events occurred during rainy season in 2010 to 2011 (from October 2010 to May 2011). The runout distance of lahar exceeded 20 kilometers from the summit reach Yogyakarta City located 24 kilometers in the south of Mt. Merapi and hit the Boyong/Code riverbank three times, on 29 November 2010, 19 March and 1 May 2011.

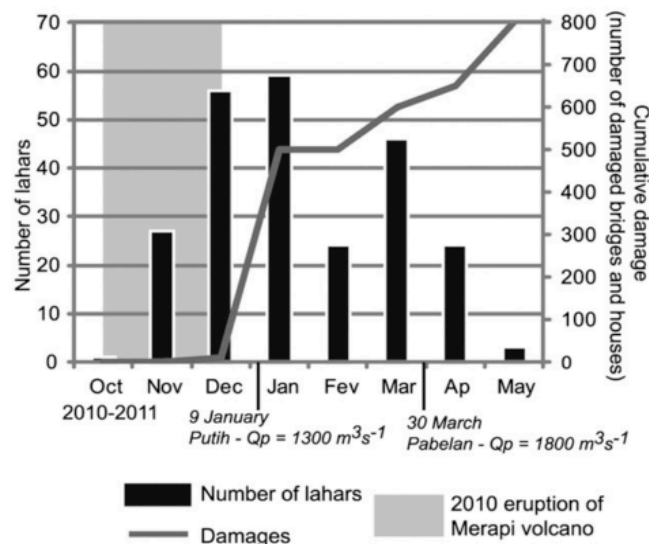


Figure 2-9 Number of lahar occurrence and related cumulative damages
(Bélizal et al, 2013)

As reported by BNPB (2010), the first cold lava flood occurred on Monday, 29 November 2010 as result of heavy rainfall in the upstream of Boyong/Code River. The flood level reached 1.5 meter in some parts of the river bank (Heryanti, 2012) and inundated more than 300 houses (BNPB, 2010). Smithsonian Institute (2010) reported that the worst was occurred on 23 January 2011 along the eroded banks of the Putih River. The major highway between Magelang and Yogyakarta was cut off when a 60 m wide section of blacktop was torn away by torrential mudflows. Up to 31 January 2011, WHO Indonesia (2011) recorded there were 3 people death, 10 inpatients, 238 outpatients and 5,082 people displaced due to cold lava flood event.

On 19 March 2011, the cold lava flood inundated the dense settlement along Code River in Yogyakarta City, water and debris inundated the settlements 50 meter from the riverbank with depth of 1.25 meter, this event caused 800 residents evacuated (Tempo News, 2011 and Kompas News, 2011). Cold lava flood event occurred again on 1 May 2011, it was reported by Jalin Merapi (2011) that cold lava flood was not only occurred in Boyong/Code

River, but also hit Opak River and Putih River. As reported, the floodwater inundates the settlement as far as about 100 meter from the embankment in Code River and closed the road due to the overflow, meanwhile in Opak River there was 1 house swept away and 2 houses buried by volcanic materials and debris.

Numerous cold lava flood events during 2010 – 2011 caused large damages in various sectors (Bélizal et al, 2013). It was recorded that 860 houses damaged, 52 levees, 14 sabo-dams and 21 bridges destroyed. The events also led to major disturbance on traffic due to damaged roads, bridges and inundation. Besides, it was also impact agriculture by burying crops and ricefields along the waterways.

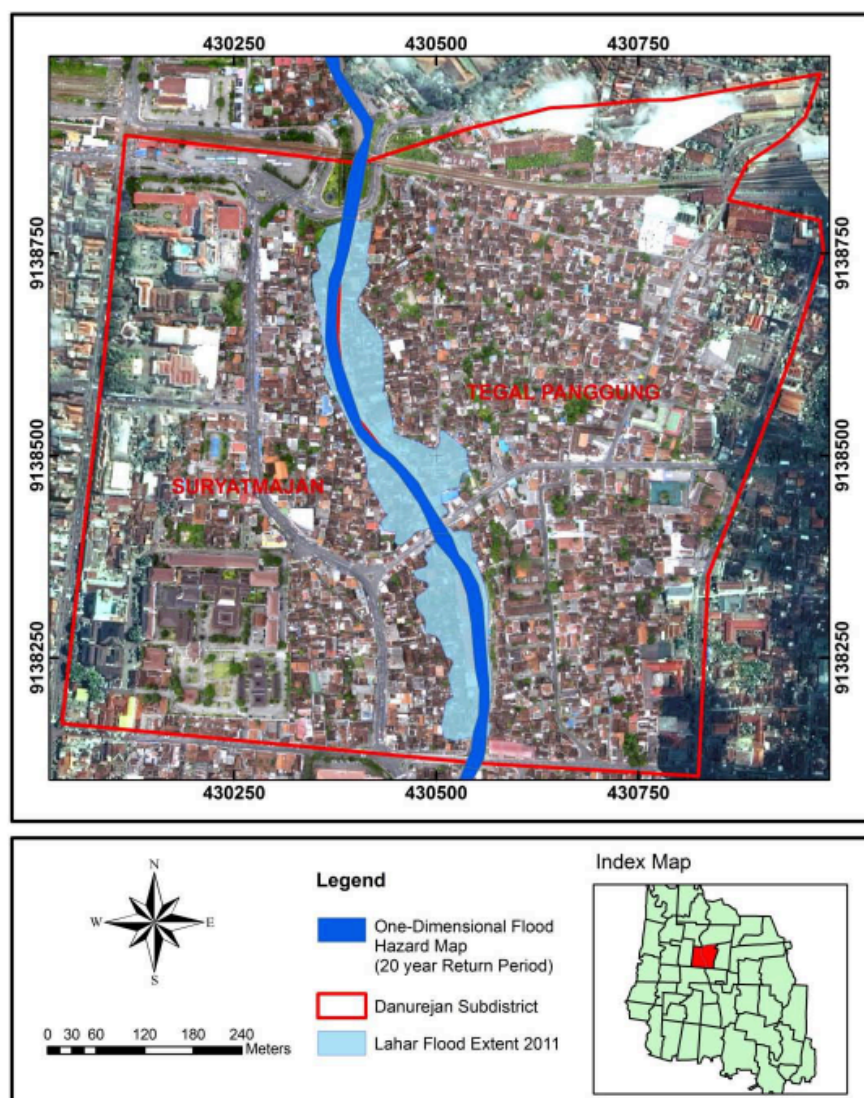


Figure 2-10 Lahar flood extent in 2011 event (Sukoco, 2013)

2.2.3.Landslide

Landslide in study area is usually occurred following the flood event or high precipitation. However, major cause of landslide in this area is there is buildings built on a steep land that is not supposed to be occupied. The land cannot support the weight of the dense settlement. Therefore, when it is triggered by heavy rain or flood, it may collapse.

Landslide is defined by Geoscience Australia as the movement of rock, debris or earth down a slope as result of the failure of the materials that make up the hill slope and are driven by the force of gravity, it can be triggered by natural causes or human activity. Natural causes include the land's geological and morphological characteristics while human activities include the deforestation, agriculture and construction. Slow landslide can be occurred over many years by slightly move, it can cause damage to property but less threat to people. In the other hand, rapid events are dangerous due to lack of early warning and the speed of the slope falling down.

There was flood occur in April 2016 simultaneously after the flood occurred. While riverine flood occurred in Winongo River, landslide event occurred in Code River. Among three rivers crossing Yogyakarta City, riverside of Code River has more dense settlement than the others. The event started with cracks of river revetment, it become early warning to the houses' owners to evacuate themselves. Therefore, there are no casualties or injures caused by this event. This event caused five houses damaged and revetment collapsed in several points (Antaranews, 2016)



Figure 2-11 Landslide event in Code River

Source: krjogja.com, Code Boyong Group

2.3. Coping strategies and adaptation

In order to protect the inhabitants and infrastructures along the river from cold lava flood hazard, there are structural and non-structural measures were taken. Structural measures consist of repairing sabo dam at the upper part of the river, raising river dike and strengthening the river embankment. Non-structural measures including the developing of early warning system called EWWS (early wireless warning system), preparing evacuation site, and held evacuation drill to increase people's knowledge to encounter of flood threat (Heryanti, 2012). In the other hand, local community carried the simplest way to monitor flood or debris flow by determine the water level trough the mark they made in the levee. This method was very effective to help them in deciding the right time to evacuate, at the same time it is also increase their awareness of the disaster they may face (Fathani and Legono, 2012).



Figure 2-12 Water level mark on the levee as monitoring and early warning
(Fathani and Legono, 2012)

In purpose to protect the settlement from flooding, the floodwall was built along Code riverside during 1991 to 1998. Local people mobilized their resources and were able to construct 6.000 m (1991: 250 m, 1992: 450 m, 1993:450 m, 1995: 712 m) of riverside dike (Setiawan, 2002). However, after the cold lava flood struck Code River in 2010, the community raises the height adjusted to the last lahar flood depth from 1.2 meter to 2 meter. According to Sukoco (2013), the raised floodwall may put the riverside are in low risk in assumption that the floodwall does not break and there will be no lahar flood event larger than 2011 event that may exceed the existing floodwall's capacity.

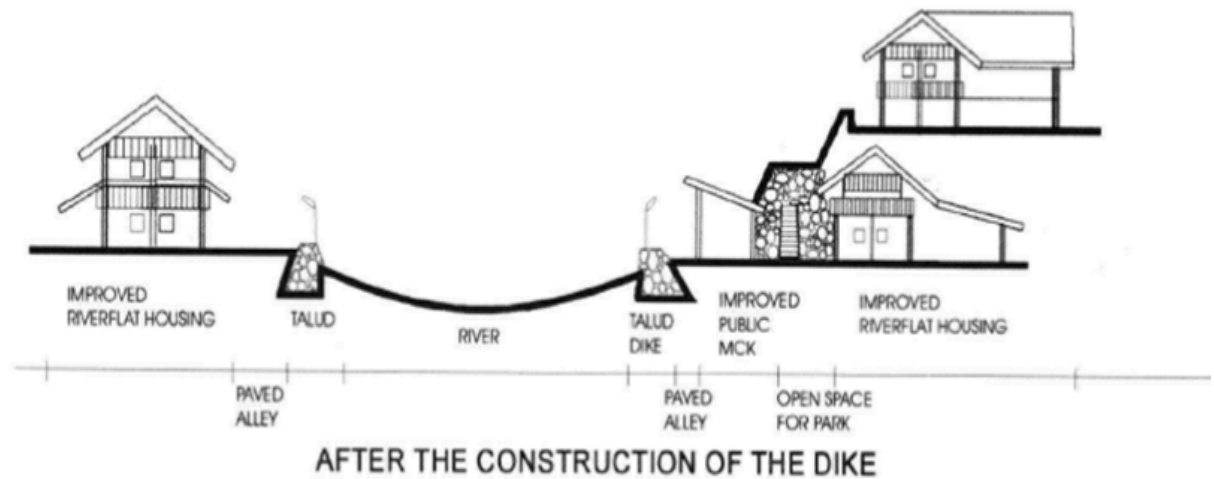


Figure 2-13 Dike construction scheme (Setiawan, 2002)



A



B



C

Figure A source <http://www.kotajogja.com>

Code river in 2009

Figure B and C show lahar flood proofing action. The community was heightened the embankment up to 1.2 meter (source Fieldwork 2012)

Figure 2-14 Heightened floodwall (Sukoco, 2013)

In order to protect the riverside area, zoning is important to define the floodplain that is the area that most likely affected by flood should be flood proofed, particularly critical facilities and essential services (UNISDR, 2002). Sulistiono (2011) recommend widening the floodplain at least 18 meters from the riverbank and dredging at least 70 centimeters from the existing riverbed. Therefore, the capacity of the river can be increased then it can retain the floodwater from overflow to the settlements.

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Chapter 3

Riverside Landscape Design

3.1. Amenity

Planning, landscape and architecture of the waterside area be required to create a special relationship with water throughout reflection, connection, frontage, access, transport views and activity (Pidwill, 1993). Accessibility is an important factor in developing urban green space, as it is provide the equality of access (Moseley et al, 2013). Moreover, provision of access becomes the generator of activity and experience in a public space (Carmona et al, 2003). Some additional features may grow alongside the promenade, such as shops, restaurants and hotel (Vollmer et al, 2015).

Riverside is basically a public space, however, the current riverside area in Yogyakarta City seems “privatized” by the local residents due to its lack of access for broader community. The narrow space for path can only accessed by the local residents, thus it cannot attract visitors, hence provision of sufficient space for access is necessary. A path for pedestrian and bicycle would allow visitors to access the riverside area comfortably and safely.



Figure 3-1 Riverside promenade of Kamo River, Kyoto

Source: Original (2014)

Riverside area is a potential public open spaces which could accommodate people’s activities, either individual or community. Carmona et al (2003) enlisted people’s primary needs towards a public space, it is includes comfort, relaxation, passive engagement, active engagement, discovery and display. An urban green space should provide a landscape that is

able to satisfy leisure needs, which is including recreational activities (Gardiner and Cole, 1991; Miller, 1997; Rohde et al, 2006).

The public spaces that can accommodate a variety of activities has the potential to become a tourist attraction, which attracts visitors not only city residents but also residents of other cities. Tourism attraction may simultaneously raise the economic activities around the area. Cheonggyecheon River is now become an iconic tourist attraction in Seoul, South Korea after the restoration, with number of visitors exceeded 10 million in 58 days, and 64,000 per day in average. There is rapid development of multipurpose buildings following the completion of restoration work that lead to increasing land price in the area. The riverside is enhanced with facilities that allow people to hold cultural events, since it is also become center of history and culture of the nation (Busquets, 2011). Tourism attraction can be generated not only by providing space or facility for activities, but also for occasional events, such as festival or exhibition.



Figure 3-2 Lantern festival in Cheonggyecheon River in Seoul, South Korea (left) and summer festival in Kamo River in Kyoto, Japan (right)

Source: rjkoehler.tumblr.com (2013) and original (2014)

Water is the source of life, so we need to realize that not only human beings who need the river, but also other living creatures that flora and fauna. Rapid development in urban areas resulted urbanization and force them to take over the land for natural resource, causing the degradation of natural environment. Bridgman et al. (1995) found that urban areas have distinctive biophysical features in comparison with surrounding rural areas. Urban heat island created as result of energy exchange, especially in a high density area, where the air temperature becomes several degrees warmer than in the countryside (Wilby, 2003; Graves et al., 2001).

Vegetations in urban area may help cities to adapt the climate change through the provision of cooler microclimates and reduction of surface water runoff. Vegetation is important in restoring river ecosystem to increase natural and aesthetic value. Moreover, vegetation also helps in reducing risk of erosion that caused by uncontrolled runoff and help stabilize riverbanks. Therefore, vegetation along the riverside should be carefully selected, in which it should not be easily washed away during flooding and have a high survival rate even with extended. In terms of preserving natural habitat, a well-designed riverside will provide good water quality, thus it can ensure the sustainability of plants and wildlife. Vegetations also provide foods and living space for birds, mammals and other animals along the river (Cengiz, 2013).

Furniture is an element in the public space, which has a role to support activities, among other seating, garbage bins, lighting, children's play facilities or even a landmark. Furniture could also contribute in developing identity or character of the area (Carmona et al, 2003). Consequently, design of the furniture should consider local culture or preference. These supporting elements are preferably made of a material that is resistant to flooding and able to tolerate the temporary immersion. Therefore, when the river floods occur, the furniture does not washed away or obsolete due to the immersion.



Figure 3-3 Supporting elements of riverside landscape, bridge (left) and water fountain (right)

Source: Original (2014)

3.2. Disaster mitigation

Aspect of disaster mitigation in riverside landscape design is very important, especially for rivers that historically often affected by disasters, especially floods. Flooding is one of the types of disaster that can be predicted, although some occurrences exceeds beyond prediction, so that casualties can be minimized through early warning system (EWS), but still there is material losses due to flooding or immersion stream. Because of casualties can be minimized, the urgency of the risk of floods is often overlooked by the public, with the pretext of "got used" to the disaster threat. Whereas, there is people who live in the riverbanks is very vulnerable due to their capacity in coping the disaster. Thus, the settlement of the problem of settlements on the riverbanks of this arrangement should be a priority in the area of the river.

For future development, riverside area should be developed as a public green open space that integrates amenity and disaster protection, particularly against flooding and erosion. Design of riparian area should restore the river to its natural state as much as possible, which means bring back the natural morphology of the river in accordance with ecological principles (Maryono, 2005). By restoring the river to its natural condition, it could solve some problems such as flooding and pollution of the river. This can be pursued through restoration of hydrology, ecology, morphology, social, economic, and institutional and regulatory. Prominski et al (2012) elaborated several criteria for flood plain design as follows:

- 1) Able to withstand the force of floodwater and tolerate temporary submersion.
- 2) Temporary uses must be found that can tolerate high water level (sports facilities, playgrounds and campsites, festival grounds, etc)
- 3) Permanently installed and material selected to be able to withstand longer flood period
- 4) Elements that cannot resist flooding must be removed

Moreover, activity or use of the riverside are should be activities that are temporary and not as a space for residence, in order to reduce the impact of flooding, either casualties or material damage. In addition, riverside area as open space can be used to facilitate evacuation in case of disaster.

Supporting infrastructure, in this case, river infrastructure such as dykes, embankments, bridges and others, must have good quality with careful planning and resistant to the threat of disasters, especially floods. The use of materials especially on supporting elements or furniture must be selected that able to withstand flooding in the long term. Thus

the infrastructure built at great cost will not washed away or necessarily damaged by the floods.

Riverside area as a public space and green open spaces should not be built with the infrastructure and furniture that require high maintenance costs. This serves to ensure the sustainability functions that have been built in order to last a long time. Open space, such as parks, built must be built with considering the cost of maintenance. In terms of disaster, the losses faced by high infrastructure maintenance costs are also higher

3.3. Conceptual design of riverside landscape

3.3.1.Existing



Figure 3-4 Existing condition of riverside area in Yogyakarta City

In current state, there is a narrow gap between river body and the settlement. As a result of the dense settlement grows along the riverside area, green open space is limited and insufficient. Flood protection applied is floodwall that is originally a revetment. The revetment is extended with height adjusted to the previous flood height. However, the floodwater is often overflowed the floodwall and caused it collapsed because it was not strong enough to withstand the flood. The existing situation is visually modified for use in CVM test with purpose to prevent bias occurrence, particularly for the respondent that familiar with the situation.

3.3.2.Design

Conceptual design of riverside area in this study is used for CVM test purpose only. The design is made with considerations of amenity and disaster mitigation functions. Amenity aspect of the design is displayed by provision of promenade and park area. 4-meter wide promenade serves as space for walking and cycling. Existence of promenade opens the access to riverside area, while in the current state the path is very narrow and limited access for visitors. Thus, by provision of promenade, it allows visitor to access the riverside area. This condition could develop the riverside area as tourism attraction and increase local economic.

Moreover, it is enhanced with green open space that serves as park area. In some points, it can be built public facilities for people's activities, such as sport yards, seating space, plaza, amphitheater, children playground, etc. Meanwhile, it can also be built natural landscape for natural habitat preservation purpose.

In terms of disaster mitigation, Sulistiono (2011) recommended to widen the riverbank to reduce flood risk. The 15-meter extended wide of the riverbank is mainly for increasing capacity of the river to carry water during flood. By widening the riverbank, it also provides space for water to flow in natural way. Moreover, a levee is build under the green space in 1.5-meter height, by considering the previous disaster risk (Sukoco, 2013).

Simple design is applied in order to reduce maintenance cost, therefore the usage of furniture is minimized. Low maintenance public facility might ensure its sustainability, due to its easiness to manage. Additionally, minimum usage of furniture also serves to reduce loss in flood event.

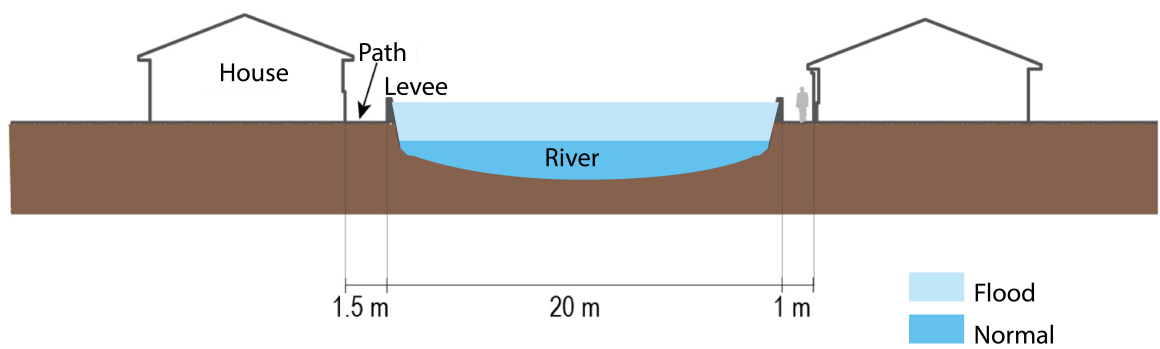


Figure 3-5 Modified visual image of existing condition

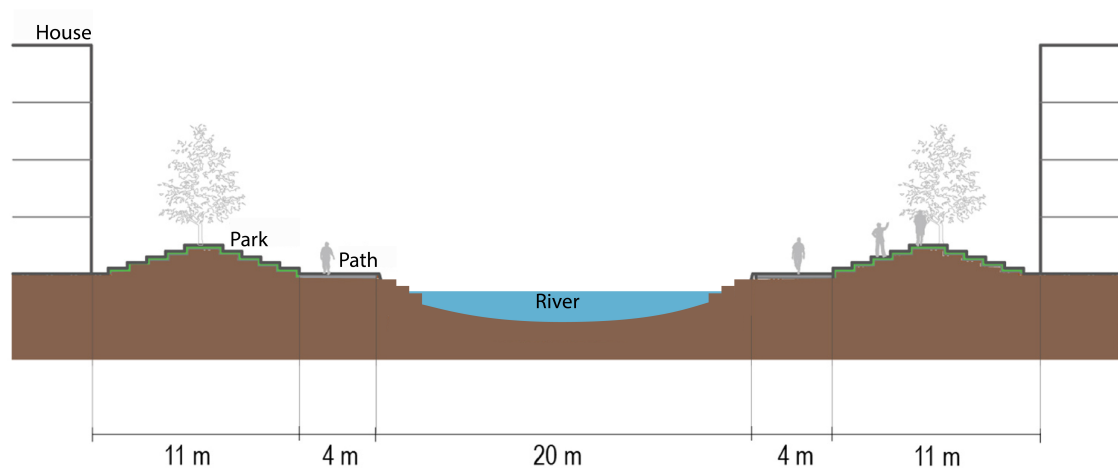


Figure 3-6 Conceptual design with amenity

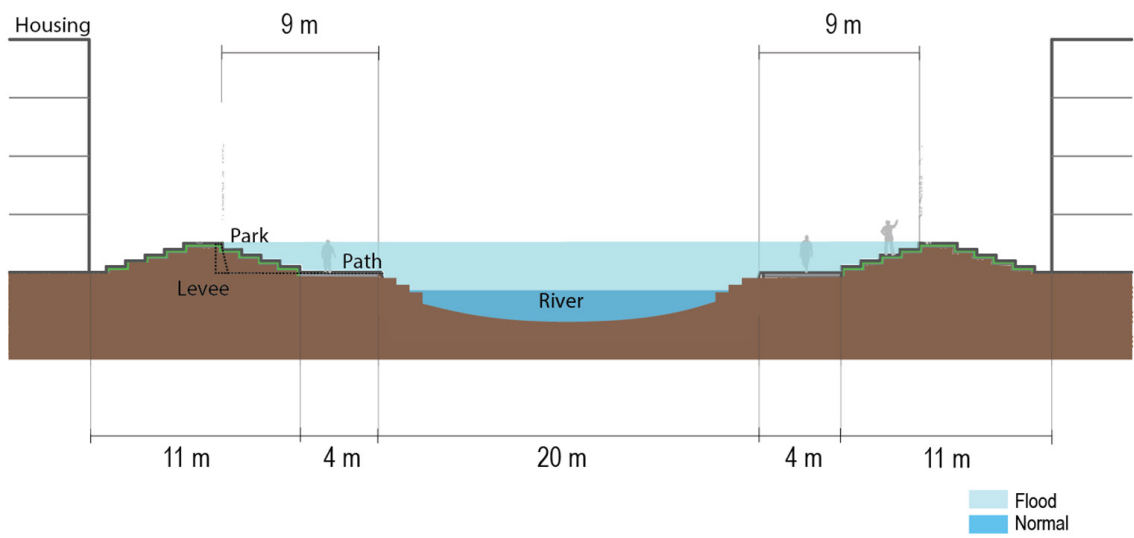
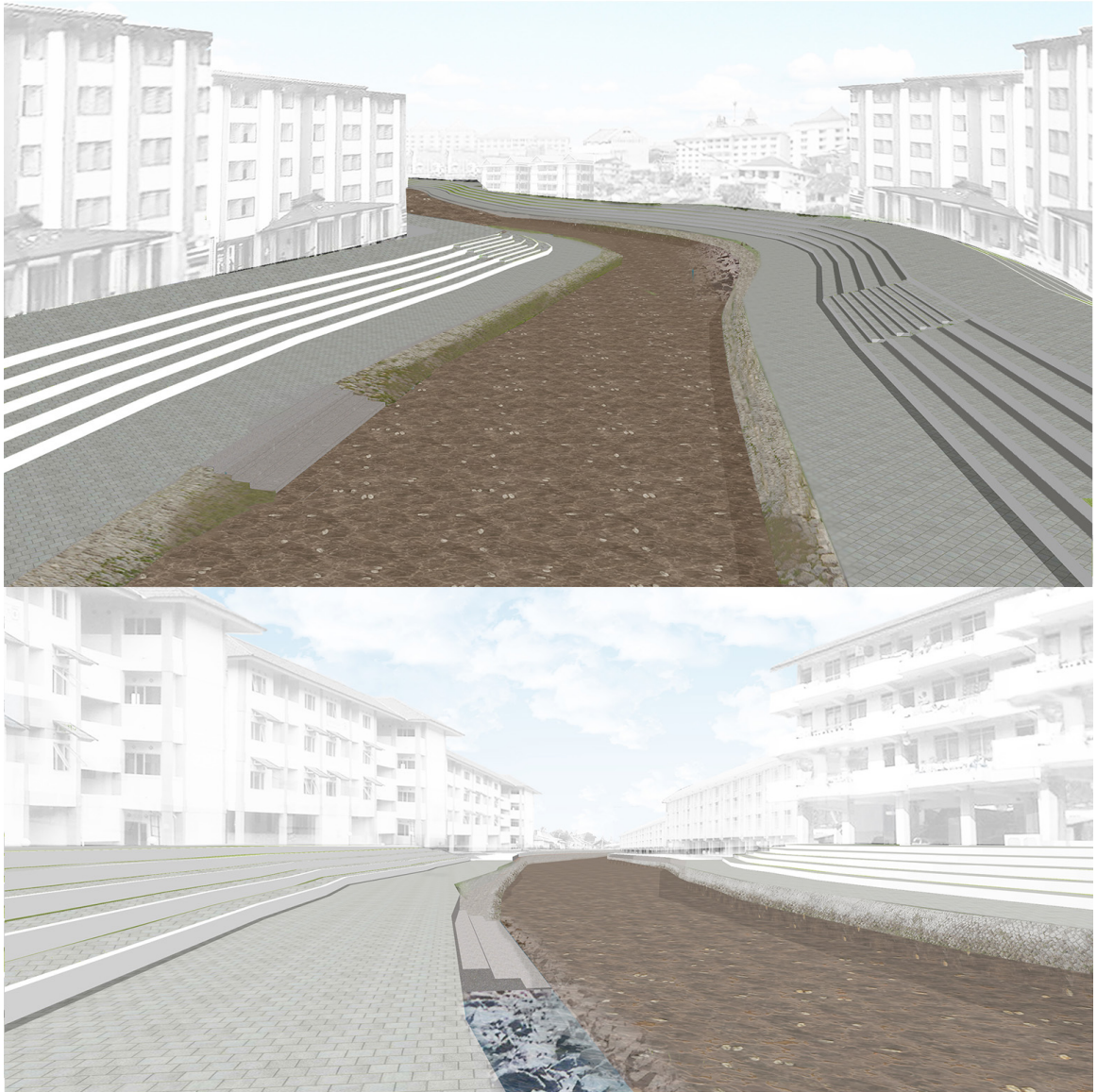


Figure 3-7 Conceptual design with disaster mitigation function

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Chapter 4

Economic Evaluation for Riverside Landscape Design

4.1. Methodology

4.1.1. Cost-benefit analysis

Economic evaluation of the development project is needed to test the feasibility or economic benefit of the development to understand public preference towards the public goods prior to decision-making, by comparing the benefits against the opportunity cost i.e. conducting cost-benefit analysis (CBA) (Ahmed and Gotoh, 2006; Lee and Yoo, 2016). CBA often used by the decision-makers because it could provide: 1) more informative and economically efficient choices (Mitchell and Carson, 1989), 2) foundation for regulatory and investment decisions about expenditures on public projects (Lindsey and Knapp, 1999), 3) justify any potential regeneration strategy and 4) supporting public participation of the proposed plans or projects (Martínez-Paz et al., 2014). Therefore, by doing economic valuation it become a part of good governance practice (Hodge and Gordon, 2008) since it assists the policy makers and local authorities to respond to the recommendations (European Commission, 1996).

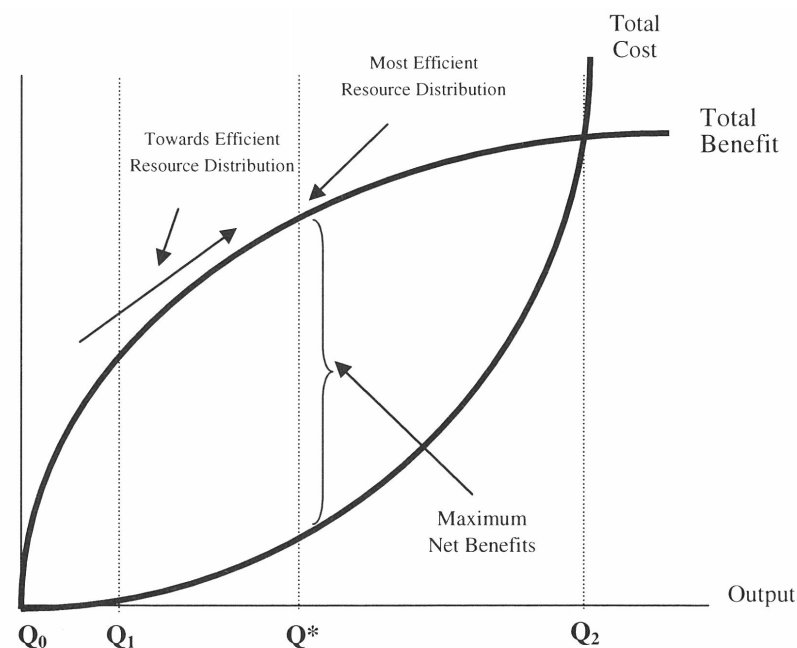


Figure 4-1 Efficient distributions of resources through CBA

(Ahmed and Gotoh, 2006)

Through CBA, efficiency can be attained when the marginal benefits is equal to marginal cost (Tietenberg, 1996). In terms of public goods, efficiency achieved when the total benefit or marginal aggregate bid/valuation curve intersect the total cost (Ahmed and Gotoh, 2006). In this case, total social welfare and utility is being optimized rather than the profits (Mitchell and Carson, 1989)

In conducting CBA, it is necessary to define the values that are to be estimated. There are two broad categories classifieds the values, namely use value and non-use value (also known as ‘passive use’) (see Figure 4-2). Use value is defined as the value of the goods or services that could be consumed directly or indirectly. Meanwhile, the non-use value is not associated with the actual consumption and not quantified in monetary terms due to the lack of market price (Ahmed and Gotoh, 2006; Boateng, 2010).

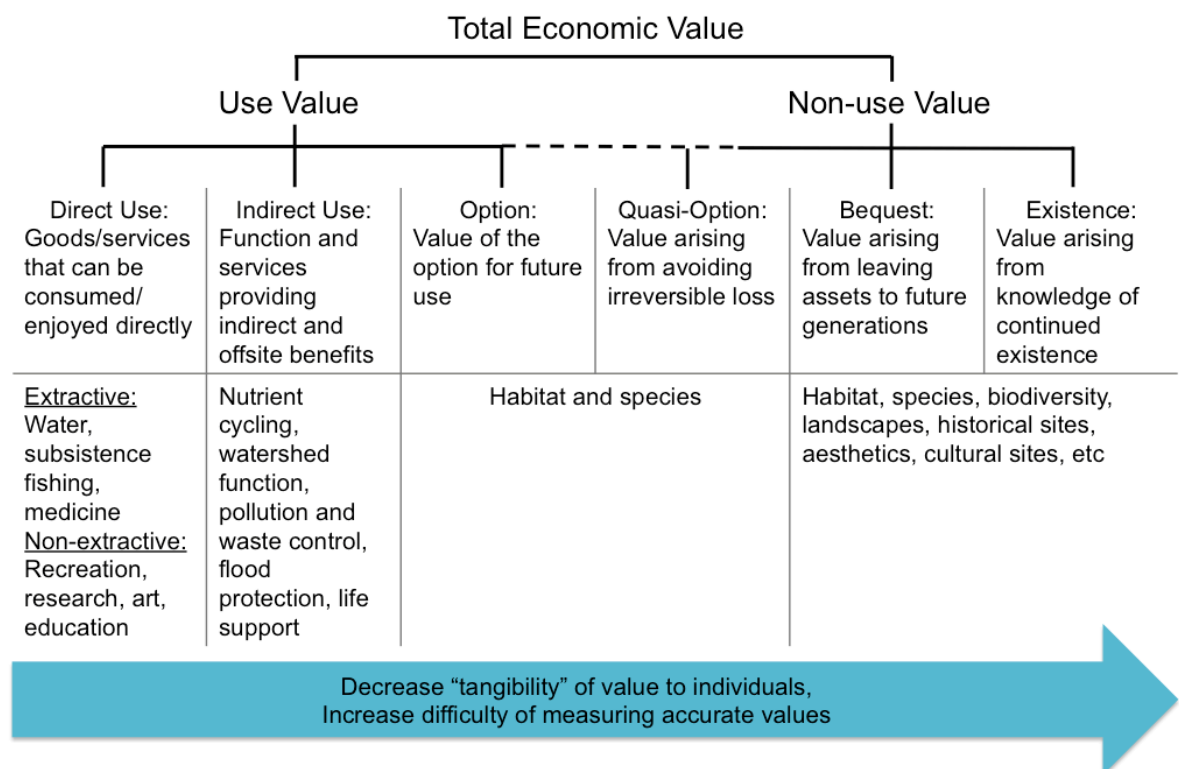


Figure 4-2 Types of economic values (Boateng, 2010)

Development of the riverside area has different economic values depend on the viewpoint, use value includes increasing land price, decreasing flood damages, compensation for relocation, in the other hand, non-use value includes among others the preservation of natural habitat. Determining the value to be estimated is important in choosing the appropriate method of valuation techniques. This research is attempted to estimate the non-

market value of landscape design in riverside area, in which it includes quasi-option, bequest and existence value. Those values are categorized in non-use value, therefore the method chosen for this research have to be able to calculate non-use value.

There are two major types commonly used in environmental valuation, namely monetary based techniques and non-monetary based techniques. Monetary based techniques values the goods or services in monetary basis, however it doesn't require that the good or services are sold in the market but need to estimate how much the people would purchase for provision or absence of the goods or services in assumption that they are forced to make a choice. Monetary based techniques include Market Price Method (MPM), Hedonic Pricing Method (HPM), Travel Cost Method (TCM), Contingent Valuation Method (CVM) and Contingent Choice Method (CCM). In the other hand, non-monetary based techniques do the valuation without placing a direct monetary value by ranking or prioritizing the expected benefits. Estimating Dose-Response Function is valuation method using non-monetary based technique (Lesser et al., 1997).

Table 4-1 Economic valuation methods

Method	Way of valuation	Application	Limitation
Revealed preference			
Hedonic pricing method	Estimates economic value of a good or services that directly affects the market prices of some other goods	Variation of housing prices	The scope of environmental benefits that can be measured is limited to things that related to housing prices
Travel cost method	Estimates willingness to pay to travel to visit the site	Value of recreation sites that have zero or nominal admission price	Cannot estimate non-use value
Stated preference			
Contingent valuation method	Estimates willingness to pay for specific goods or services, based on a hypothetical scenario	Use and non-use value	Susceptible to biases, cannot distinguish attributes
Choice experiment	Choose the most preferred alternative	Value of each attributes of a profile in marketing research	Elicitation format and conditional logit model

Source: compiled and adapted from Ahmed and Gotoh, 2006; Kuriyama, 1999b

CVM is commonly used for valuing the environmental resources (Carson et al., 1995). This method allows to capture full-range of benefits, both use and non-use value, that the society obtain from a public good or service (Latinopulos et al., 2016). In addition, single dichotomous choice CV format can be incentive compatible under some assumptions and the one time “yes” or “no” respond is relatively easy for respondents (Kuriyama, 1999a).

Despite the advantages elaborated above, CVM also has limitation in which it cannot be used to distinguish the value of each attributes because it can only estimates the total value. In addressing this gap, attribute-based methods are then introduced, namely rating based conjoint analysis and choice experiment. Rating based conjoint analysis estimated the value by rate the respondent’s preference among profiles on scale while choice experiment chooses the profile they most prefer. Both rating based conjoint analysis and choice experiment has similarities in repeated questions and profiles that bundles the attributes. Although there is increasing number of attribute-based studies, but mostly are used in marketing research and less in environmental research or that are estimate non-use values. These studies reveals unsolved problems of attribute-based methods; 1) the elicitation format may enable the respondent to not report their true preference and 2) the conditional logit model (Kuriyama, 1999b).

Based on the literatures, despite the potential biases and the limitation in distinguishing the value of each attribute, CVM could carry out the value of both use and non-use value. Therefore, CVM appears to be appropriate to meet this study’s objectives. In conducting CVM study, design and execution of the research must be handled carefully to provide reliable results.

4.1.2. Contingent valuation method

Contingent valuation surveys were first proposed in theory developed by Ciriacy-Wantrup (1947) for eliciting the market valuation of a non-market good. The application of the method then used by Davis (1963) to estimate the value of economic value of outdoor recreation in Maine – USA. However, Hanemann (1992) found that there is a US National Park Service-funded research in 1958 also using CVM for an outdoor recreation in Delaware River Basin – USA. In its early development, CVM used infrequently during 1960s and exclusively in the US.

The use of CVM increased in 1980s and received more criticisms due to its potential occurrence of biases towards the results. Mitchell and Carson (1989) did a review of the theoretical and empirical basis of contingent valuation. Afterwards, Arrow and Solow (1993) along with National Oceanic and Atmospheric Administration formed a ‘Blue-Ribbon Panel’ to evaluate CVM and set guidelines for conducting CVM survey. Thereafter, more recently reviews of CVM presents in Moons (2003), Venkatachalam (2004), Schlöpfer (2006), Hoyos (2010), Noonan (2003), and Brander and Koetse (2011).

Contingent valuation method (CVM) itself is defined as a method to estimate the value that people place on a particular good (Ahmed and Gotoh, 2006). CVM is considerably used to identify economic value of natural landscape amenities, which perceived as non-use value (Verbič et al., 2016). In the survey, CVM offers two alternatives to the respondents: 1) the status quo option with no public intervention (without case) and 2) specific hypothetical scenario that people are supposed to finance (with case) (Dachari-Bernard et al., 2012; Verbič et al., 2016). Subsequently, the respondents is asked for their willingness to pay or highest sum that individual are prepared to pay for a change in spatial goods. This concept refers to the amount that people willing to pay to get the merits of specific services or willingness to endure welfare loss from a reduced provision of services (Mitchell and Carson, 1989; Garrod et al., 1996).

In case to measure the value of riverside landscape, there are given situations, the existing conditions with no improvements (without case) and proposed design that improving the existing conditions (with case) presented as hypothetical scenario. Then, the respondent is asked for their willingness to pay for the improved landscape compares to the existing condition. The estimated amount of payment for the good is considered as the value possessed by the landscape design or improvement of the landscape.

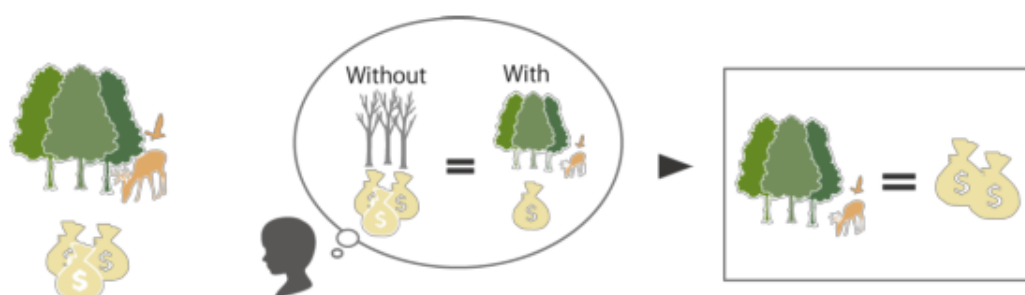


Figure 4-3 Illustration of CVM measure

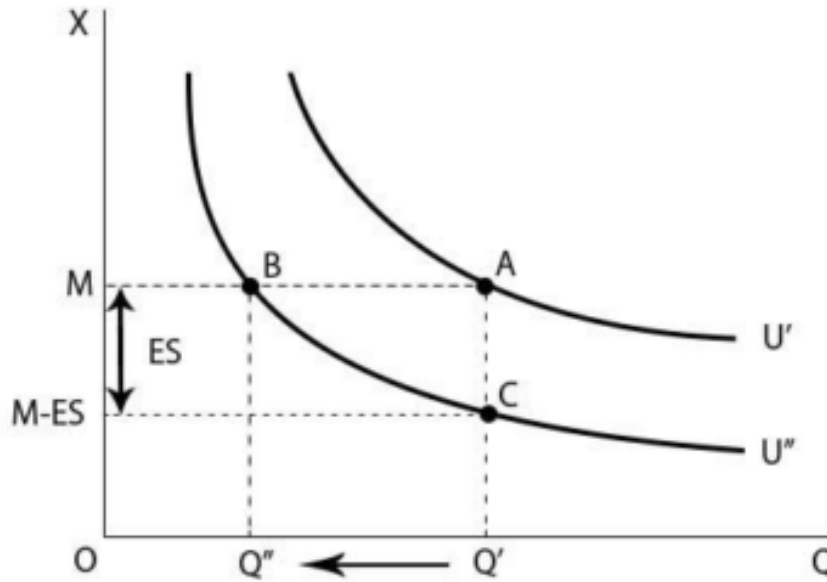


Figure 4-4 Value of environment to quantity

The above Figure 4-4 presents the WTP is around the equivalent surplus ES, where the vertical axis X is price and the horizontal axis Q is quantity of goods. Point A is assumed as the condition of with case, in which the landscape is improved, this margin expressed as $U' = V_A(p, Q', M)$. Meanwhile, income is represented in point B because it is a state that the environment is turned worse from Q' to Q'' , thus it becomes U'' . In order to prevent the environmental degradation, some amount has to be paid to maintain the Q' state. The utility in U'' is maintained in point C, in which the environment is in the same level as A. Thus, the difference the price of point B to point C is the equivalent surplus (ES), the amount that may be paid the maximum in order to the respondents to prevent environmental degradation. Therefore, U'' is expressed as $U'' = V_B(p, Q'', M), V_C(p, Q', M-ES)$.

Despite the flexibility of this method in providing the estimated economic value of various things, there is possibility that several biases may occur due to the failures in the survey, which could affect its validity and reliability (Venkatachalam, 2004). In addressing this problem, the National Oceanic and Atmospheric Administration (NOAA) Panel suggests to pretesting the interview schedule and pilot studies should be made a precondition in any CV study, therefore it can produce reliable results to be used as basis for administrative and judicial decisions (Arrow et al., 1993).

To measure the influence of knowledge towards the design, CVM in this study is executed in 2 (two) stages: 1) first, valuation of design with explanation of amenity aspect, 2) second, valuation of design with explanation of function aspect. Moreover, the opposite order of 2-stage CVM will also be executed to clarify the influence of the order of information or question to the valuation. In addition, there are 3 (three) CVM tests are executed in this study to investigate the influence of order of explanation and image to the valuation.

4.1.3. Survey design

Reviews of CVM studies reveals that there are major criticism regarding the results of CVM, they are validity and reliability (Smith, 1993; Freeman, 1993; Arrow and Solow, 1993). Validity refers to the degree to which the CVM measures the true economical value of individuals, which refers to Hicksian consumer surplus measure. Meanwhile, reliability refers to extent to which the variance of WTP amounts is due to random sources (Mitchell and Carson, 1989; Venkatachalam, 2003). In addressing this problems, NOAA panel set guidelines in conducting CVM study (Arrow and Solow, 1993), there are several recommendations: 1) conservative survey design, 2) double-bounded referendum elicitation method, 3) willingness to pay format, 4) door-to-door in-person interview, 5) scope issues and 6) no-vote option.

Scenario plays important role in CVM studies, according to NOAA Panel guidelines, the scenario must describe the programme or policy accurately to the respondents so it can enhance the credibility of the survey and reliability of the results (Arrow et al., 1993; Kwak and Yoo, 2015). Scenario of redevelopment is designed to build knowledge, and a conceptual design for improving the existing condition is proposed. Image of the design displayed to be examined through valuation of citizen's impression toward the design.

The scenario in this study developed from explanation of the existing condition, which leads to negative effects, then the importance of redevelopment by applying the proposed design. Information of the design provided in image and explanation. The explanation is divided into 2 (two) aspects, namely amenity and function. Amenity aspect consists of aesthetic and recreational feature of the design. Meanwhile, function aspect focus in disaster mitigation feature, that is to protect the riverside area from risk of flooding. There are 3 (three) types of the questionnaire performed in this study, they are distinguished by the order, image, and explanation.

Table 4-2 Types of questionnaire

Type	Stage 1		Stage 2	
	Image	Explanation	Image	Explanation
A		Amenity		Function
B		Function		Amenity
C		Function		Amenity

The questionnaire consists of 4 (four) parts. In the first part, we let the respondent briefly evaluate the design compared to existing condition by evaluate the images using semantic differential (SD). In the second part, monthly willingness to pay (WTP) to the proposed riverside design were asked in 2 stages, 1) amenity and 2) function aspect. Prior to question of WTP, the explanation of one aspect (e.g. amenity) is explained in attempt to build understanding for certain point of view in the valuation. Besides, risk understanding and attitude toward riverside area are also investigate in third part. The purpose is to find the influencing factors to the valuation. Basic information of the respondents, such as gender, age, income, occupation, and education were asked in the last part.

4.1.4. Elicitation and bid amount

Following the NOAA blue-ribbon panel (Arrow et al., 1993), which recommends to use referendum question rather than an open-ended question. By this regard, dichotomous-choice (DC) format is used in this study. Respondents are asked ‘yes’ or ‘no’ question for specific amount to pay for the plan or policy, in this study is improvements of riverside area.

There are several kinds of elicitation method under DC formats, among others, single-bounded DC (SBDC) and double-bounded DC (DBDC) are the most commonly used. SBDC asked the closed-ended question at once, while DBDC is followed by the question if they would pay a higher or lower amount considering the first bid (Ahmed and Gotoh, 2006). SBDC is more familiar to the respondents due to its similarity to the market condition (Desvousges et al., 1993), however, there is probability that the respondent is accepting the bid level due to ignorance about true valuation. In the other hand, DBDC might also face the similar problem in the follow-up bid that influenced by the first bid. Nevertheless, by using DBDC, more statistical efficiency can be achieved as additional information can be elicited (Bateman et al., 1999). In such consideration, this study used DBDC format for method of elicitation.

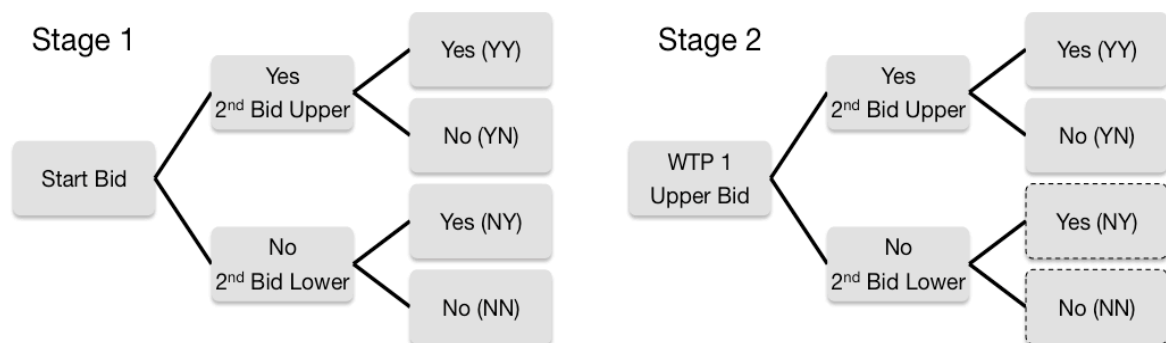


Figure 4-5 Application of DBDC elicitation method

Bid amount determined by considering the pre-test result. There are 5 prices that randomly offered for different amount of start bid used for valuation (see Table 4-3). The currency used in this study is Indonesian rupiah (IDR), in which JPY 1 is equal to IDR 116 or USD 1 is equal to IDR 13,227. Payment vehicle used in this study is additional tax, tax refers to land and building (L&B) tax and income tax. Duration of the payment is during the respondent’s occupancy in Yogyakarta City.

Table 4-3 Bid values		
1 st bid	2 nd bid	
	Yes (Higher)	No (Lower)
1000	2000	500
2000	5000	1000
5000	10000	2000
10000	20000	5000
20000	30000	10000

4.1.5.Data collection method

4.1.5.1. Pre-test

Pre-test is conducted prior to the questionnaire survey in the field. The pre-test is done in purpose to test the questionnaire (Arrow et al., 1993); to evaluate whether the questionnaire is understandable or not, identify potential bias occurrence and determine bidding price for willingness to pay (WTP).

The pre-test was conducted during 15 July 2015 – 12 August 2015. The survey was done through internet survey using Google Spreadsheet. Question of willingness to pay is ask in open-ended question, “How much you willing to pay for the development of riverside in 3 (three) rivers in Yogyakarta City as additional tax?”. Targeted respondents are the people who currently living in Yogyakarta City. There is 39 valid data obtained through the survey. The result of pre-test is analyzed statistically using SPSS, it is includes socio-demographic variables, attitudinal variables and willingness to pay. Result of WTP from pre-test survey is then used to determine the bid-value for WTP in the real questionnaire.

The questionnaire is evaluated by considering the results of pre-test. In terms of the design images, explanations and questions, there are several revisions has made in order to reduce biases and to be easily understood by the respondents.

4.1.5.2. Interview and questionnaire survey

Data collection of primary data is done during 4 September 2015 – 28 October 2015 and during 8 January 2016 – 4 February 2016 through questionnaire survey in Yogyakarta City - Indonesia. Briefed survey assistants used to carry out the interview with the family representatives door to door. Survey assistants are needed in order to obtain targeted number of sample. The survey assistants hired through open recruitment for bachelor students and

alumnus of Urban and Regional Planning – Gadjah Mada University. There are 11 assistants hired to conduct interview survey in Yogyakarta City.

Questionnaire sheet became a guideline in conducting the interviews. Survey assistant conducted the interview according to the questions in the questionnaire, and explain the scenario that is written in the questionnaire sheet. Design images are printed in separate booklet to show the clearer images to the respondents.



Figure 4-6 Survey assistant conducting interview survey

4.1.5.3. Sampling

This study conducted in Yogyakarta City, Indonesia. The study area is selected because riverside area in this city is exposed to risk of floods, particularly cold-lava flood or lahar flood due to the existence of 3 (three) main rivers that both headed in Mt. Merapi. Riverside areas typically used as high-density settlements, and the community living in those areas is mostly low-income communities.

Data collection encompasses 14 subdistricts in Yogyakarta City. Samples are household who currently living in Yogyakarta City. Random sampling is used with number of sample in each subdistrict is determined by the percentage of number of household (see Table 4-4).

There are 900 personal interviews conducted by trained interviewer during September to October 2015. Interview was done face-to-face with family representatives. Face-to-face interview were chosen rather than phone interview or mail in purpose to meet the number of sample, in addition to help the respondent understand the scenario and questions more easily.

Each type of the questionnaire obtained different number of valid data, 333 of Questionnaire type A (amenity – safety), 247 of Questionnaire type B (safety – amenity), and 280 of Questionnaire type C (safety – amenity).

Table 4-4 Sampling of the survey

Subdistrict	Household	%	Sample	Area (km ²)
Danurejan	6961	5.3	16	1.1
Gedongtengen	6873	5.2	16	0.96
Gondokusuman	13496	10.2	31	3.99
Gondomanan	4955	3.7	11	1.12
Jetis	9233	7	21	1.7
Kotagede	10223	7.7	23	3.07
Kraton	7307	5.5	16	1.4
Mantrijeron	11851	8.9	27	2.61
Mergangsan	10348	7.8	23	2.31
Ngampilan	5961	4.5	13	0.82
Pakualaman	3596	2.7	8	0.63
Tegalrejo	11735	8.9	27	2.91
Umbulharjo	21098	15.9	48	8.12
Wirobrajan	8913	6.7	20	1.76
Kota Yogyakarta	132550	100	300	32.5

Source: Office of Demographic Affairs of Yogyakarta Special Region, 2014

4.1.6. Data analysis

There are three groups of variable are analyzed in this research, willingness to pay (WTP), socio-demographic and attitudinal. WTP is the main focus of this study, therefore the other two groups of variable are related to WTP.

WTP is analyzed in three methods; descriptive, extrapolation and graphic comparison. Descriptive analysis was done to determine WTP value of each type of questionnaire (Type A, B and C) by using software CVM 4.0. By using this software, we calculated WTP applying double bounded elicitation. We input the data of bidding values, along with upper and lower bids. Then, input the number of people response to WTP: yes-yes (YY), yes-no (YN), no-yes (NY) and no-no (NN). The software is automatically calculated the WTP and also provide the margin of WTP that shows the distribution of WTP response.

	T1	TU	TL	YY	YN	NY	NN
1	1000	2000	500	39	14	5	8
2	2000	5000	1000	21	27	4	3
3	5000	10000	2000	15	42	15	5
4	10000	20000	5000	5	19	19	19
5	20000	30000	10000	14	20	18	21
6							
7							
8							
9							
10							

Figure 4-7 Data input for calculation using CVM 4.0

The CVM 4.0 software is calculated WTP in three types of value; mean without-cut, mean with-cut and median. This study is only use the result of mean with-cut and median for further analysis of WTP value. WTP calculated in this analysis is WTP per household per month. Therefore, in order to obtain the WTP value in larger scale, extrapolation is calculated, in which WTP value (mean and median) that is acquired from the previous calculation is multiplied by total number of household and twelve months.

Graphic comparison is used to analyze the result of WTP by comparing the bar chart of WTP derived from descriptive analysis. Value of Amenity and Function aspect of the riverside landscape design in the valuation is determined through analyzing the gap between graphs of mean WTP. In addition, graph of median WTP is used to confirm the analysis by comparing to graph of mean WTP.

Socio-demographic and attitudinal variables are analyzed statistically in descriptive analysis to show the characteristics of respondents (see Section 4.2). The characteristics of respondents are used to build deeper understanding towards the respondents' background. At the same time, those variables are analyzed with bivariate analysis to find the correlation to WTP as determinants (see Section 4.5).

4.2. Characteristics of respondents

4.2.1. Socio-demographic variables

Yogyakarta City is divided into 14 subdistricts, therefore, number of sample is determined by percentage of population per subdistrict to total population of the city (see Table 4-5). Valid questionnaire acquired may different from the supposed percentage of respondent, but not significantly different. Table 4-5 shows the number of responses obtained from the door-to-door in-person interview survey.

Table 4-5 Number of respondents per subdistrict

Subdistrict	Type A		Type B		Type C		Total Respondent	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Danurejan	15	4.5	12	4.9	10	3.6	37	4.3
Gedongtengen	18	5.4	16	6.5	9	3.2	43	5.0
Gondokusuman	23	6.9	21	8.5	28	10	72	8.4
Gondomanan	22	6.6	6	2.4	12	4.3	40	4.7
Jetis	24	7.2	17	6.9	21	7.5	62	7.2
Kotagede	27	8.1	27	10.9	20	7.1	74	8.6
Kraton	16	4.8	16	6.5	15	5.4	47	5.5
Mantrijeron	32	9.6	17	6.9	27	9.6	76	8.8
Mergangsan	25	7.5	22	8.9	23	8.2	70	8.1
Ngampilan	13	3.9	12	4.9	12	4.3	37	4.3
Pakualaman	9	2.7	8	3.2	8	2.9	25	2.9
Tegalrejo	32	9.6	20	8.1	27	9.6	79	9.2
Umbulharjo	53	15.9	35	14.2	48	17.1	136	15.8
Wirobrajan	24	7.2	18	7.3	20	7.1	62	7.2
Total	333	100	247	100	280	100	860	100

Table 4-6 shows profile of respondents in terms of age, sex and marital status. Respondents of this research is household representative, therefore the respondent should be in proper age or an adult to answer the questionnaire. The average age of the respondents is around 31 to 40 years old, while there is almost equal number of respondents in term of sex. Most of the respondents are married (83.49%) while the others are single.

Table 4-6 Age, sex and marital status of the respondents

	Type A	Type B	Type C	Total	%	Mean
Age						3.89
1) 0-20	8	9	5	22	2.56	
2) 21-30	61	27	34	122	14.19	
3) 31-40	68	52	66	186	21.63	
4) 41-50	99	69	73	241	28.02	
5) 51-60	75	58	58	191	22.21	
6) 61-70	20	26	36	82	9.53	
7) 71-80	2	6	7	15	1.74	
No answer	0	0	1	1	0.12	
Total	333	247	280	860	100	
Sex						
Male	195	106	133	434	50.47	
Female	138	139	147	424	49.30	
No answer	0	2	0	2	0.23	
Total	333	247	280	860	100	
Marital status						
Married	265	211	242	718	83.49	
Single	68	32	38	138	16.05	
No answer	0	4	0	4	0.47	
Total	333	247	280	860	100	

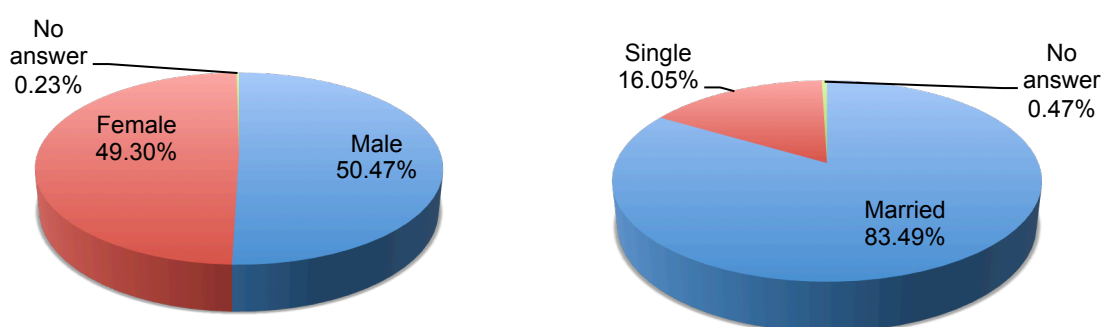


Figure 4-8 Distribution of sex (left) and marital status (right) of the respondents

Table 4-7 shows the profile of education, occupation and income of the respondents. There are to 7 (seven) levels of education from none to graduate, 9 (nine) types of occupations identified and 9 (nine) levels of income. Education and occupation represent the individual response while income is represent total household income.

Table 4-7 Education, occupation and income of the respondents

	Type A	Type B	Type C	Total	%	Mean
Education						4.05
1) None	1	8	8	17	1.98	
2) Elementary school	22	29	38	89	10.35	
3) Junior high school	30	32	38	100	11.63	
4) Senior high school	178	125	137	440	51.16	
5) Diploma	18	25	23	66	7.67	
6) Bachelor	74	26	29	129	15.00	
7) Graduate	9	2	6	17	1.98	
No answer	1	0	1	2	0.23	
Total	333	247	280	860	100	
Occupation						
Company employee	60	37	46	143	16.63	
Government officer	36	11	12	59	6.86	
House person	74	45	60	179	20.81	
Part-time Worker	14	1	2	17	1.98	
Retired	18	24	22	64	7.44	
Self-owned Business	79	105	109	293	34.07	
Student	37	7	8	52	6.05	
Unemployed	2	3	9	14	1.63	
Other	13	14	12	39	4.53	
Total	333	247	280	860	100	
Income						4.4
1) 0 - 500,000	24	31	12	67	7.79	
2) 500,000 - 1,000,000	51	56	28	135	15.70	
3) 1,000,000 - 1,500,000	51	48	47	146	16.98	
4) 1,500,000 - 2,000,000	70	34	40	144	16.74	
5) 2,000,000 - 2,500,000	44	26	35	105	12.21	
6) 2,500,000 - 3,000,000	27	18	45	90	10.47	
7) 3,000,000 - 3,500,000	16	13	25	54	6.28	
8) 3,500,000 - 4,000,000	16	10	19	45	5.23	
9) 4,000,000 ~	32	11	27	70	8.14	
No answer	2	0	2	4	0.47	
Total	333	247	280	860	100	

Education level of the respondents in average is senior high school (4.05), in which the respondent who graduated high school is half of the total respondent. This number shows that education level of most of the respondent is below high school. This is similar to education level of the total population that is 79.3% of their education lever is below high school (Demographic Bureau of Yogyakarta Special Region, 2015).

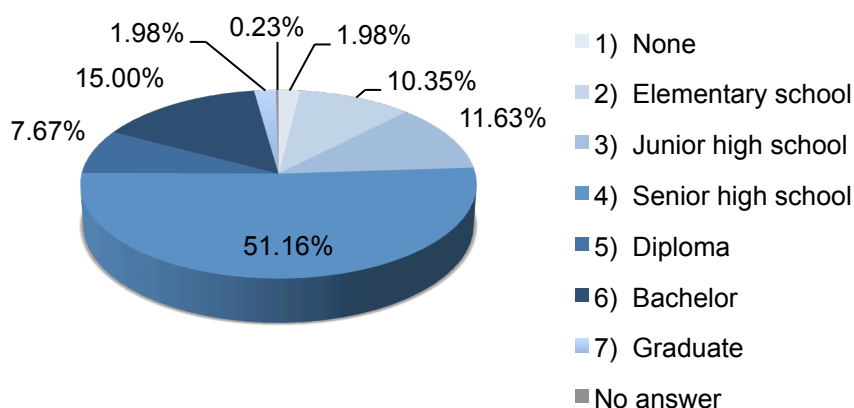


Figure 4-9 Distribution of education of the respondents

In term of occupation, most occupation of the respondent is self-owned business (34.07%), house person (20.81%) and company employee (16.63%). Compared to total population of Yogyakarta City (Demographic Bureau of Yogyakarta Special Region, 2015), student has the largest number (21.9%) following by company employee (19.9%) and house person (14%).

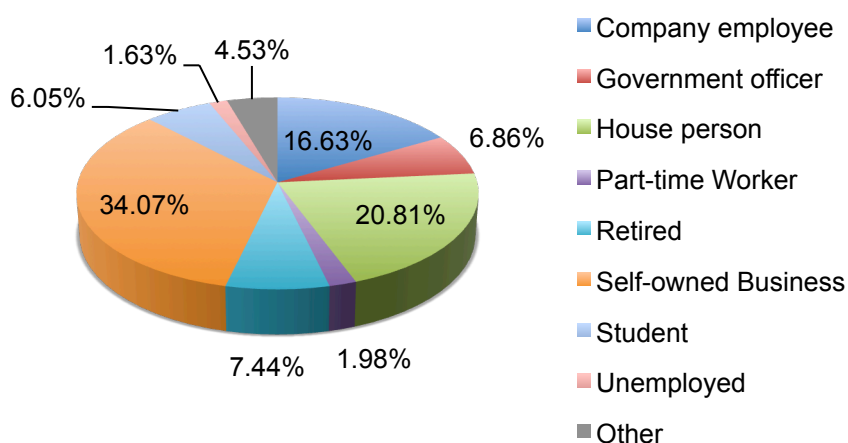


Figure 4-10 Distribution of occupation of the respondents

Household income of the respondent in average is between range of IDR 1,500,000 to IDR 2,000,000 (Mean = 4.4). Meanwhile, according to Decree Number 252/Kep/2014 for Regional Minimum Wage of Yogyakarta City, regional minimum wage standard of Yogyakarta City in 2015 is IDR 1,302,500.

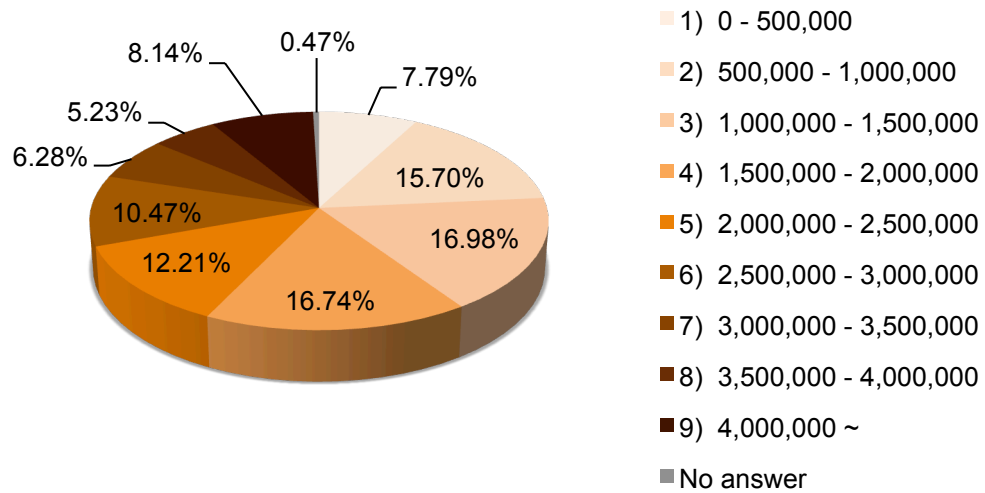


Figure 4-11 Distribution of household income of the respondents

Household size is number of person living in the same household, in average each household contains 4 persons, that is usually includes father, mother and 2 children. At the same time person who earn income in the household in average is 1.89, which means there is 1 to 2 persons are the breadwinner.

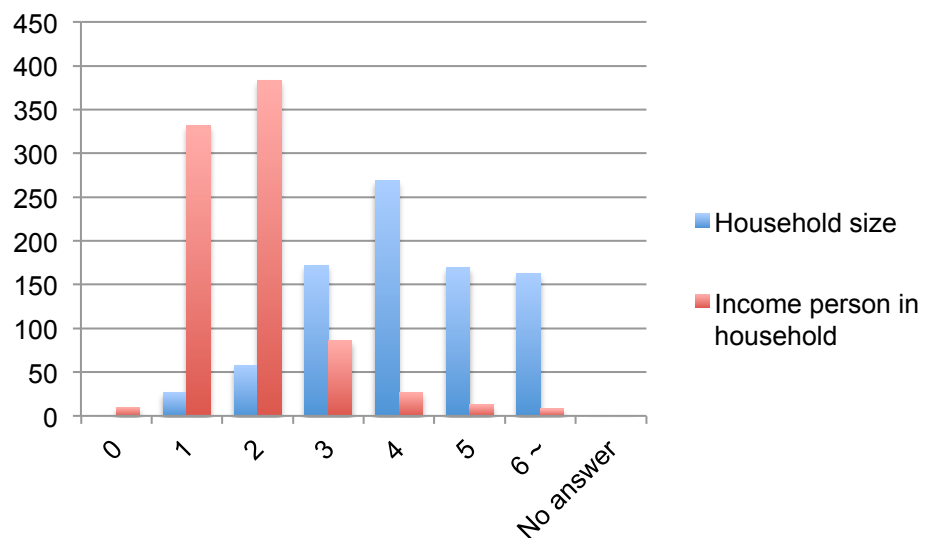


Figure 4-12 Household size and income person in household of the respondents

Table 4-8 Household size, income person in household, house ownership and living duration of the respondents

	Type A	Type B	Type C	Total	%	Mean
Household size (persons)						4.37
1	11	10	6	27	3.14	
2	13	22	23	58	6.74	
3	47	66	59	172	20.00	
4	120	68	81	269	31.28	
5	77	40	53	170	19.77	
6 ~	65	40	58	163	18.95	
No answer	0	1	0	1	0.12	
Total	333	247	280	860	100	
Income person in household (persons)						1.89
None	4	2	4	10	1.16	
1	152	80	100	332	38.60	
2	140	115	128	383	44.53	
3	22	33	31	86	10.00	
4	9	9	9	27	3.14	
5	3	5	5	13	1.51	
6 ~	3	2	3	8	0.93	
No answer	0	1	0	1	0.12	
Total	333	247	280	860	100	
House ownership						
Owned	278	195	244	717	83.37	
Rent	55	50	36	141	16.39	
No answer	0	2	0	2	0.23	
Total	333	247	280	860	100	
Living duration						5.79
1) 0 - 5 years	13	13	9	35	4.07	
2) 6 – 10 years	15	10	13	38	4.42	
3) 11 – 15 years	22	14	13	49	5.69	
4) 16 – 20 years	21	20	11	52	6.05	
5) 21 – 30 years	58	32	56	146	16.98	
6) 31 – 40 years	62	43	66	171	19.88	
7) 41 – 50 years	76	58	46	180	20.93	
8) 51 years ~	66	57	64	187	21.74	
No answer	0	0	2	2	0.23	
Total	333	247	280	860	100	

In terms of living, 83.37% of the respondents own the house while 16.40% are rent, thus, house ownership in Yogyakarta City is high. Most of respondents are live in Yogyakarta City for more than 30 years.

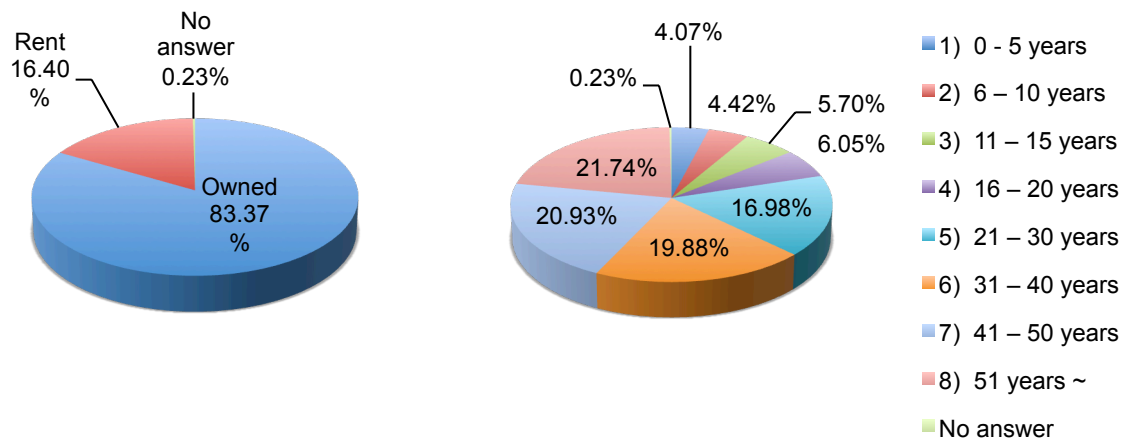


Figure 4-13 Distribution of house ownership (left) and living duration (right) of the respondents

4.2.2. Attitudinal variables

Attitudinal variables include the respondents' attitude towards riverside area, experience of flood disaster and impression towards the proposed design. Respondent's attitude towards riverside area encompasses the closest river to their house, distance from house to the closest river and frequency of visit to the riverside (see Table 4-9). Experience of flood disaster comprises whether the respondent is ever experience flood disaster or not, and their estimation of the occurrence of future flood disaster affecting their house (see Table 4-10).

According to the survey, 45.47% of the respondent stated that the closest river from their house is Code River, due to its location in the middle of Yogyakarta City. There are 26.86% of the respondents are living close to the river in distance between 0 – 50 meter from the river. In the other hand, 22.67% of the respondents living between 500 meter – 1 kilometer from the river.

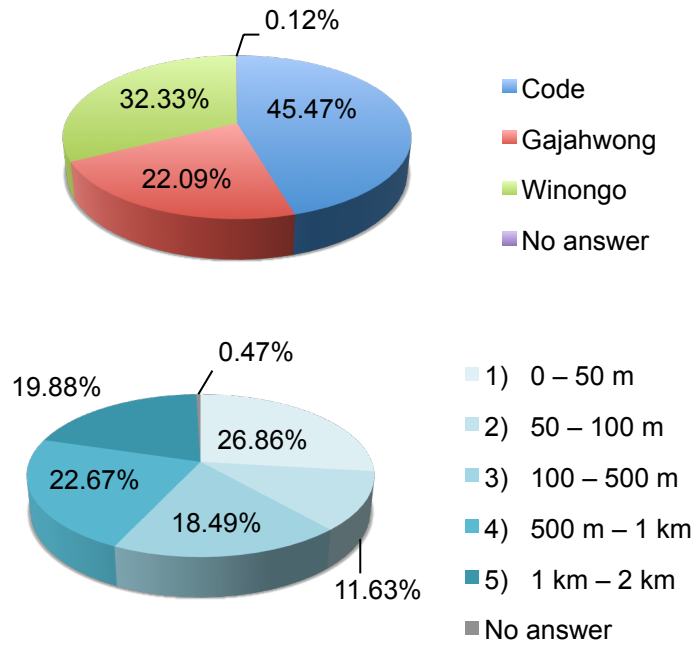


Figure 4-14 Distribution of closest river (top) and distance to river (bottom) of the respondents

Table 4-9 Attitude towards the riverside

	Type A	Type B	Type C	Total	%	Mean
Closest river						
Code	140	101	150	391	45.47	
Gajahwong	70	69	51	190	22.09	
Winongo	122	77	79	278	32.33	
No answer	1	0	0	1	0.17	
Total	333	247	280	860	100	
Distance to closest river						2.96
1) 0 – 50 m	124	50	57	231	26.86	
2) 50 – 100 m	29	36	35	100	11.63	
3) 100 – 500 m	53	52	54	159	18.49	
4) 500 m – 1 km	62	74	59	195	22.67	
5) 1 km – 2 km	62	34	75	171	19.88	
No answer	3	1	0	4	0.46	
Total	333	247	280	860	100	
Frequency of visit						2.77
1) Never	51	54	64	169	19.65	
2) Uncertain	124	98	88	310	36.05	
3) Once/several time(s) a month	34	32	36	102	11.86	
4) Once/several time(s) a week	40	24	39	103	11.98	
5) Every day	84	36	53	173	20.12	
No answer	0	3	0	3	0.35	
Total	333	247	280	860	100	

There is as much as 74.42% of the respondents have never been experience flood disaster, while 25.47% are had experienced flood disaster. It is related to the distance to river, people who live closer to river are more likely experienced to flood disaster ($R=-0.388$). Estimation of occurrence of future flood disaster is mostly low and very low (see Figure 4-16). As well as the experience, estimation of flood disaster is related to distance from house to the closest river ($R= -0.455$).

Table 4-10 Flood experience and flood estimation of the respondents

	Type A	Type B	Type C	Total	%	Mean
Flood experience						
Yes	99	52	68	219	25.47	
No	234	194	212	640	74.42	
No answer	0	1	0	1	0.12	
Total	333	247	280	860	100	
Flood estimation						2.12
1) Very low	132	65	135		38.60465116	
2) Low	85	83	64		26.97674419	
3) Moderate	68	62	40		19.76744186	
4) High	40	20	38		11.39534884	
5) Very high	6	15	3		2.790697674	
No answer	2	2	0		0.465116279	
Total	333	247	280	860	100	

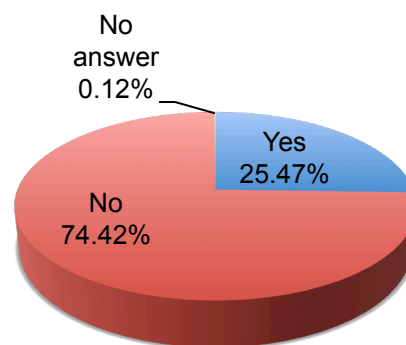


Figure 4-15 Distribution of the respondents' experience of flood disaster

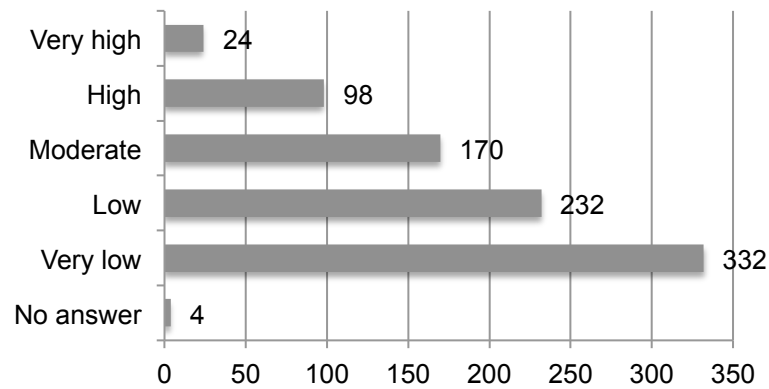


Figure 4-16 Distribution of the respondents' estimation of flood disaster

Impression towards proposed design is measured in semantic differential. The respondents are asked to evaluate the existing condition and the proposed design in two bipolar adjectives in scale of -2 to 2. Image evaluation was done through comparative analysis of arithmetic mean. Generally, the result of arithmetic mean is increased from the existing to design. Attractiveness obtained highest points, it is means that the respondents think that the design will improve the existing condition to become more attractive. However, even though it is increased, natural obtained lowest than the other adjectives. Spacious increased significantly, because the design is obviously widen the riverbank.

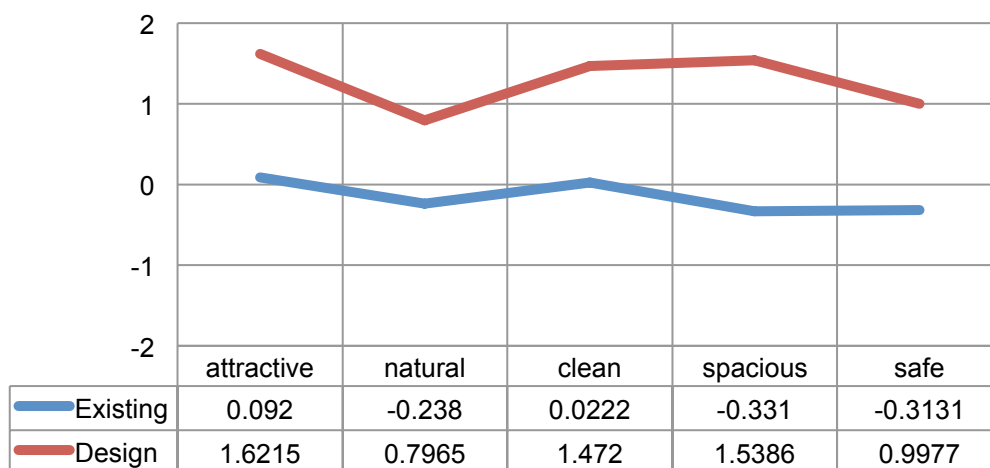


Figure 4-17 Impressions of proposed design

4.3. Estimation of willingness to pay (WTP)

This section explains the result of calculation of willingness to pay (WTP) for the proposed riverside landscape design in Yogyakarta City for each type of the questionnaire. In this research, the estimation of willingness to pay (WTP) is done by use CVM Version 4.0 for Excel. The estimation of willingness to pay is mainly considered by value of mean WTP with-cut, in addition, value of median WTP is shown for deeper analysis.

WTP is questioned in 2 stages, in which each type has different order of explanation and question. WTP of Stage 1 (WTP_1) is the WTP of the design considering certain aspect that explained first, later, the respondent be explained of the other aspect of the design and be asked for WTP of both aspect (WTP_T). Therefore, WTP of Stage 2 (WTP_2) is the total WTP (WTP_T) minus WTP of Stage 1 (WTP_1).

$$WTP_T = WTP_1 + WTP_2$$

WTP_T : total WTP

WTP_1 : WTP of Stage 1

WTP_2 : WTP of Stage 2

4.3.1.Type A

Questionnaire Type A in the first stage explained the amenity aspect and asked the WTP considering the amenity features of the proposed design. Then, in the second stage, function aspect was explained and the respondent be asked for the WTP of both aspect of amenity and function.

WTP of stage 1 (WTP_{1A}), in which the image of design is followed by the explanation of amenity, is estimated as much as 10,360 IDR per household per month. Whereas, in stage 2, the design is followed by the explanation of functions, total WTP (WTP_{TA}) is estimated as much as IDR 12,401 per household per month. The result showed that there is an increasing number of WTP from stage 1 (WTP_{1A}) to stage 2 (WTP_{TA}) as much as IDR 2,041. There are significant change between WTP_1 and WTP_T , as result of Paired T-test, it indicates that the respondent is likely changing their WTP in stage 2 after received the explanation of function, $t(333) = -2.4$, $p = 0.018$.

Table 4-11 Image and explanation of Type A

Type	Stage 1		Stage 2	
	Image	Explanation	Image	Explanation
A		Amenity		Function

Table 4-12 Willingness to Pay of Questionnaire Type A

	Stage 1	Stage 2	Total
Mean WTP (IDR)	10,360	2,041	12,401
Median WTP (IDR)	6,841	2,566	9,407
Extrapolated WTP			19,725,030,600
Likelihood	- 0.318	0.086	
p	0.018		
R	0.498		
Sample	333		

1 JPY = 116 IDR, 1 USD = 13,227 IDR

Percentage of respondent and WTP is illustrated in Figure 4-17, it is shown that the higher amount of WTP the percentage is decreased. Table 4-12 shows that, related to the initial bid, the likelihood to answer higher WTP in Stage 1 is -0.318, which indicates that the higher amount of WTP offered in initial bid, the less number of respondent willing to pay. In the other hand, in Stage 2 the correlation result positively, as much as 0.086, shows that the higher WTP offered in initial bid, the more number of respondent willing to pay. The likeliness is related to the answer of the first stage, $R = 0.498$, people who is willing to pay (answer yes-yes) in Stage 1 is more likely to add more WTP in Stage 2 or vice versa.

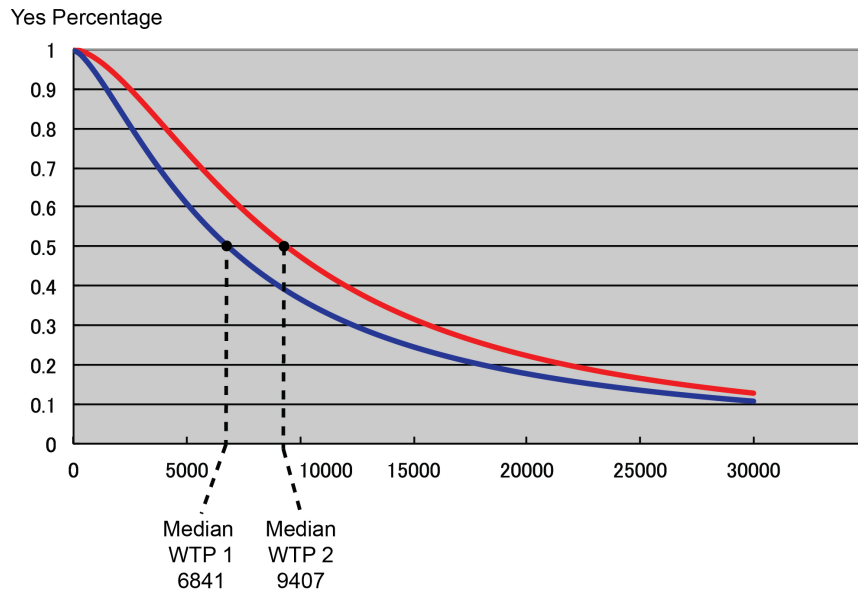


Figure 4-18 Percentage of willingness to pay (WTP) Questionnaire Type A

4.3.2. Type B

Type B questionnaire showed the same image of the design as in type A questionnaire. However, the order of explanation is reversed, in which Function aspect is explained in Stage 1 and Amenity aspect is explained in Stage 2. The reversed order of explanation aims to identify the influence of order of explanation to the valuation.

WTP of type B in Stage 1 (WTP_1B) is estimated as much as IDR 9,756 per household per month, with the explanation of Function aspect. Then, in Stage 2, WTP (WTP_2B) is increased to IDR 10,637 per household per month. It means that after get explained of Amenity aspect, there is more WTP (WTP_2B) added as much as IDR 881. As result of Paired T-test, $t(247) = -7.4$, $p = 0$, it indicates that the respondent is likely changing their WTP in stage 2 after received the explanation of function, therefore there are significant change between WTP_1 and WTP_T .

Table 4-13 Image and explanation of Type B

Type	Stage 1		Stage 2	
	Image	Explanation	Image	Explanation
B		Function		Amenity

Table 4-14 Willingness to Pay of Questionnaire Type B

	Stage 1	Stage 2	Total
Mean WTP (IDR)	9,756	881	10,637
Median WTP (IDR)	6,722	1,129	7,851
Estrapolated WTP			16,919,212,200
Likelihood	-0.542	-0.046	
p	0		
R	0.392		
Sample	247		

1 JPY = 116 IDR, 1 USD = 13,227 IDR

Figure 4-19 illustrates percentage of respondent and WTP, similarly to type A, it is shown that the higher amount of WTP the percentage is decreased. Likewise, the likelihood to answer higher WTP is related to initial bid in the first stage, the correlation is -0,542, this number explains that the higher amount of WTP offered in initial bid, the less number of respondent willing to pay. However, in Stage 2, the likeliness is not strongly related to the initial bid of Stage 2, which is determined by result of Stage 1, as much as -0.046. The likeliness to add more WTP in Stage 2 is related to the answer of the first stage, $R = 0.392$. WTP of type B resulted narrow difference between margin of WTP_1 and WTP_T . In addition, median WTP ($\text{Median } WTP_{2B} - \text{Median } WTP_{1B}$) is also not change so much, as much as IDR 1,129.

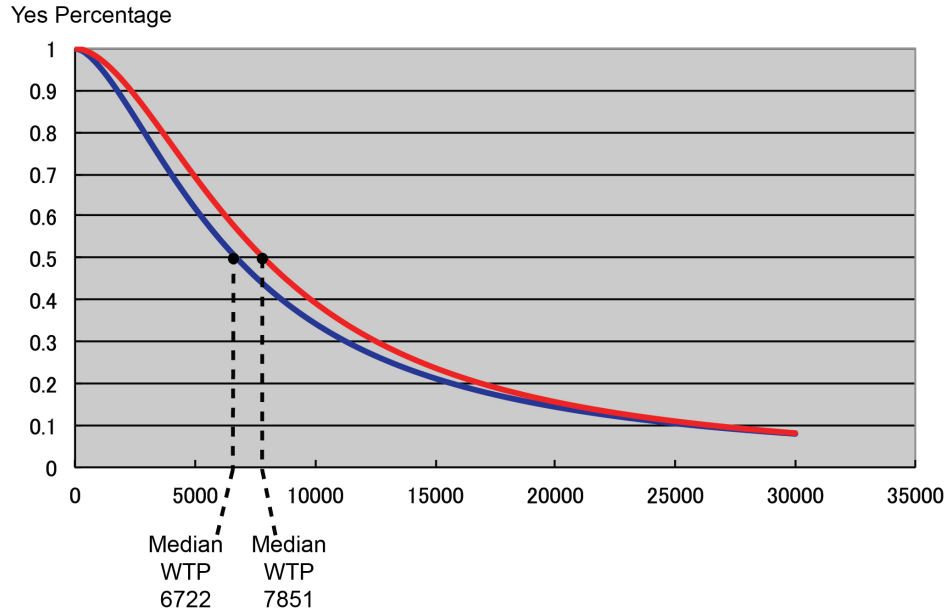


Figure 4-19 Percentage of willingness to pay (WTP) Questionnaire Type B

4.3.3. Type C

Type C questionnaire has the same order of explanation as type B, that is Function aspect is explained in Stage 1 and followed with Amenity aspect in Stage 2. However, the image of the design is different; in Stage 1 shows function only and in Stage 2 shows landscape-designed image.

Mean willingness to pay of Stage 1 (WTP_{1C}) is estimated as much as IDR 9,403 per household per month, after explanation of Function aspect. Then, in Stage 2, after the explanation Amenity aspect, the total WTP (WTP_{TC}) is estimated as much as IDR 10,978 per household per month. The WTP (WTP_{2C}) is increased as much as IDR 1,575. Paired T-test result similarly to type A and type B, it indicates that the respondent is likely changing their WTP in stage 2 after received the explanation of function, $t(280) = -3.2$, $p = 0.002$.

Table 4-15 Image and explanation of Type C

Type	Stage 1		Stage 2	
	Image	Explanation	Image	Explanation
C		Function		Amenity

Table 4-16 Willingness to Pay of Questionnaire Type C

	Stage 1	Stage 2	Total
Mean WTP (IDR)	9,403	1,575	10,978
Median WTP (IDR)	5,449	697	6,146
Extrapolated WTP			17,461,606,800
Likelihood	-0.435	0.334	
p	0.002		
R	0.622		
Sample	280		

1 JPY = 116 IDR, 1 USD = 13,227 IDR

The margin of WTP_{1C} and WTP_{2C} shows the increasing mean of WTP (see Figure 4-20). The pattern is similar with type A and type B, in which the higher amount of WTP, the percentage of respondent is decreased. The relation between initial bid and answer of first stage, -0.435, indicates that the higher amount of WTP offered in initial bid, the less number of respondent willing to pay. Meanwhile, the relation between initial bid and answer on Stage 2 shows stronger relationship than both in type A and type B, 0.334. This result indicates that unlike in the other types of questionnaire, WTP in type C is has stronger correlation to its initial bid. It is confirmed by the correlation between the answer of Stage 1 and Stage 2, $R = 0.622$, that is strong correlated.

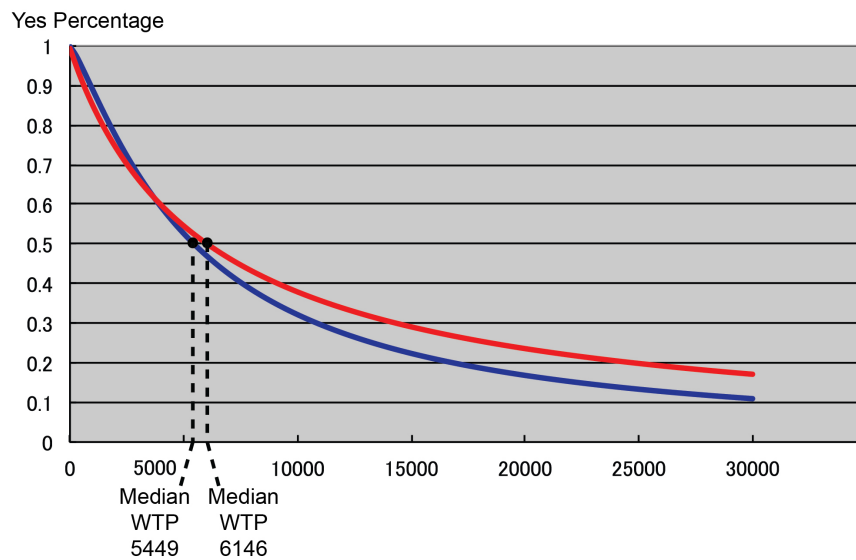


Figure 4-20 Percentage of willingness to pay (WTP) Questionnaire Type C

4.4. Comparison of willingness to pay

4.4.1. Type A and B

Images used for valuation in Type A and B is exactly same, both in Stage 1 and 2. The difference is the order of explanation and WTP question given to the respondent. In the end, respondent of both Type A and B received the same explanation of the design, amenity and safety aspect. However, the respondents answered WTP of each type of questionnaires differently. The WTP is examined in terms of average with-cut and median.

In Stage 1, WTP of the type A questionnaire (WTP_1A), which explanation is Amenity aspect, obtained IDR 10,360 in average. Meanwhile, type B questionnaire (WTP_1B) obtained lower than type A, IDR 9,756 in average. Hence, there is as much as IDR 604 gap between type A and B ($WTP_1A - WTP_1B$). By this regard, it means that in Stage 1, explanation of Amenity aspect perceived higher than Function aspect.

In Stage 2, additional explanation of the other aspects is provided. Therefore, in this stage the respondent received the same information, both Amenity and Function aspect. Respondent is asked for their WTP by considering both aspects in this stage. Type A questionnaire (WTP_2A) added IDR 2,041 after the explanation of Function aspect, in the other hand type B questionnaire (WTP_2B) only added IDR 881 after the explanation of Amenity aspect. The gap of added WTP ($WTP_2A - WTP_2B$) in this stage is as much as IDR 1,160. In stage 2, Function aspect is obtained higher WTP than Amenity aspect.

Table 4-17 Image and explanation of Type A and B

Type	Stage 1		Stage 2	
	Image	Explanation	Image	Explanation
A		Amenity		Function
B		Function		Amenity

The similar behavior is applied in median WTP, although the amount of WTP is lower than average WTP. In first stage, type A questionnaire obtained more WTP than type B questionnaire, with the gap ($\text{Median WTP}_1A - \text{Median WTP}_1B$) is only IDR 119. Then, in Stage 2, type A questionnaire is also added higher WTP than in type B with gap ($\text{Median WTP}_2A - \text{Median WTP}_2B$) as much as IDR 1473.

Both type A and B is showing the same image in Stage 1 and Stage 2 in the questionnaire. Therefore, the difference of WTP between type A and type B is caused by different order of explanation. In Stage 1, although the design is explained in certain aspect (type A is Amenity aspect and type B is Function aspect), it may also include value of the other aspects. However, there are amenity values that can be determined by considering the gap between graph of type A and type B (see Figure 4-21). In Stage 2, the respondent is explained the other aspect of the design (type A is Function aspect and type B is Amenity aspect). In this stage, the respondent valued the design by considering both aspects, and then they were asked for the added WTP for the design. Hence, the change of WTP is influenced by the added information given. By this regard, WTP in Stage 2 is considered as pure WTP of the explained aspect.

With explanation of Amenity aspect of the design, WTP of type A in Stage 1 (WTP_{1A}) is higher than type B (WTP_{1B}), which explained the Function aspect of the design. It means that the WTP is influenced by the explanation of Amenity aspect, therefore the value of Amenity in type A is include Amenity with explanation as much as IDR 604. Moreover, by considering the gap of Stage A between type B and type C (see Section 1.1.2.2), the WTP of type A in Stage 1 is also include value of Amenity without explanation as much as IDR 353. In Stage 2, WTP of type A with explanation of Function aspect is higher than type B with explanation of Amenity aspect. It means that the pure WTP of Function aspect is higher than the Amenity aspect. Thus, in deeper consideration, most respondent think that it is important to pay more for function instead of amenity.

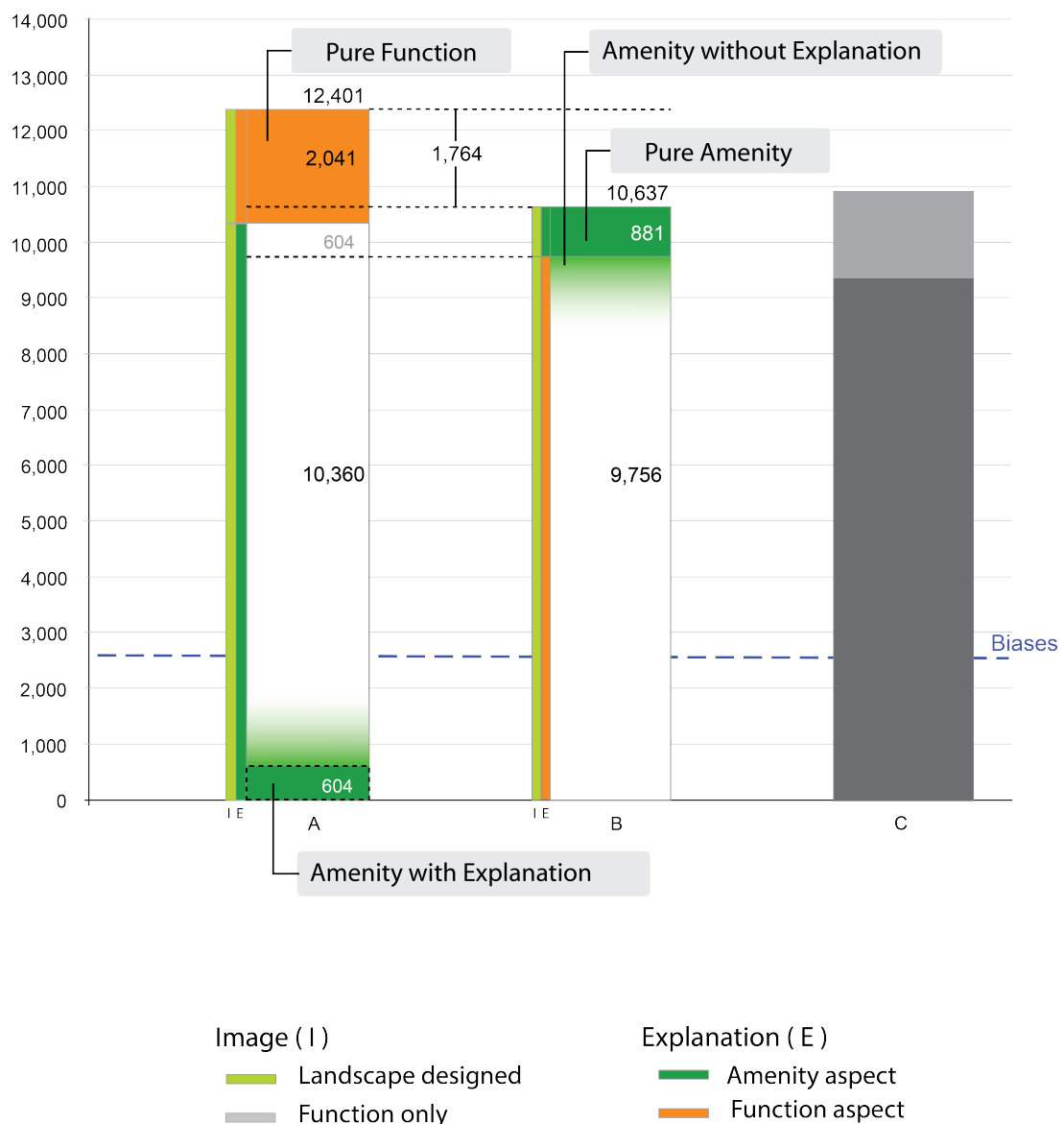


Figure 4-21 Mean WTP of Type A and B

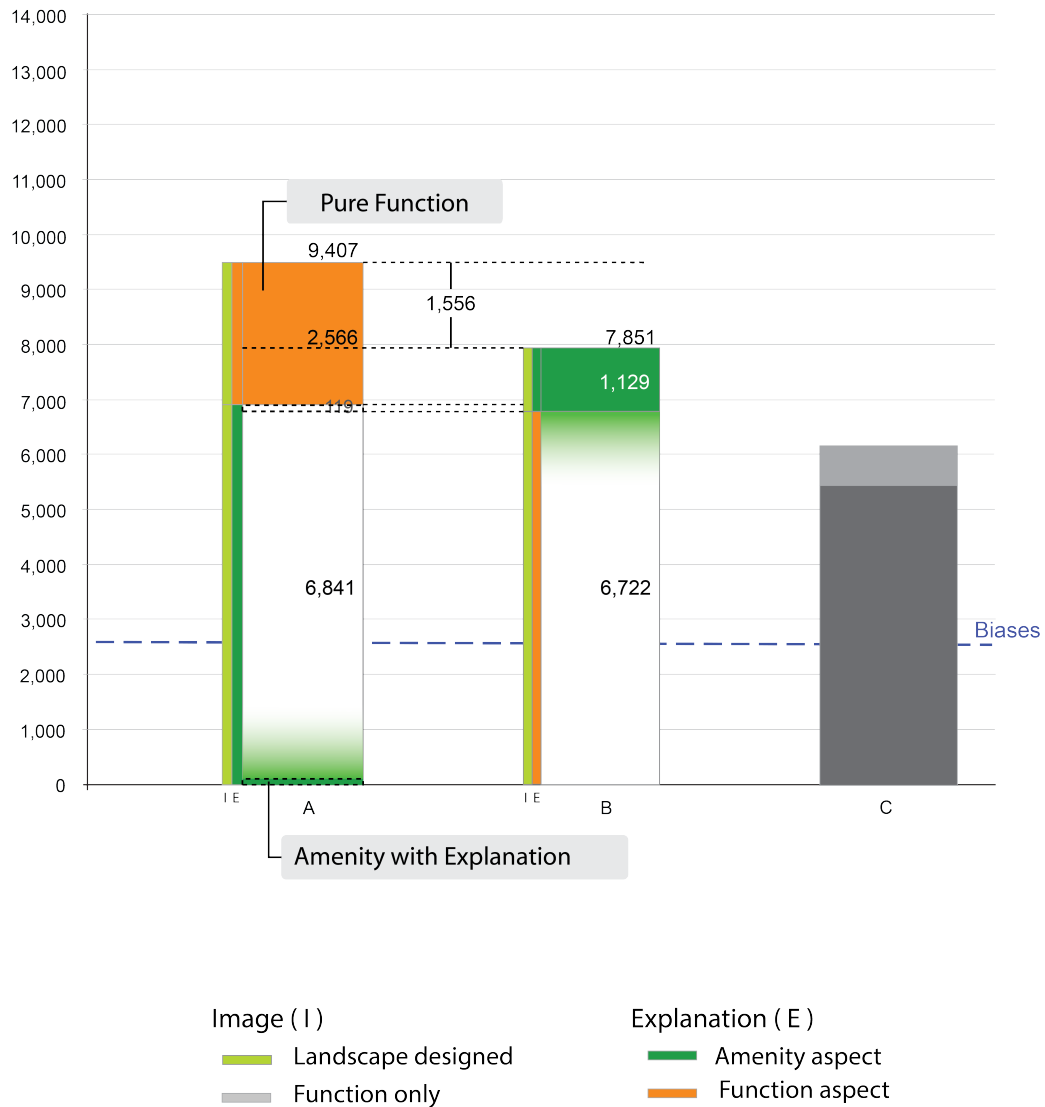


Figure 4-22 Median WTP of Type A and B

4.4.2. Type B and C

Comparison between questionnaire type B and C is aimed to identify the influence of different images used in the questionnaire to the valuation. In type B questionnaire, the image show more amenity aspect, while the image of type C questionnaire in Stage 1 shows function only, which is only shows the image of the structure. In Stage 2, the images shown are exactly same. The order of explanation in both types is same, in which Function aspect is explained first then followed by Amenity aspect.

In Stage 1, both type B and type C are given the explanation of Function aspect of the design, however, the images shown are different. As result, WTP of type B (WTP_1B) is slightly higher than type C (WTP_1C) as much as IDR 353 (see Figure 4-23). This gap means that the image that shows more amenities could acquire more WTP whereas the explanation is about Safety aspect. Therefore, the image is influencing the valuation. The median WTP also shows the similar tendency in Stage 1 (see Figure 4-24), due to lack of amenity appearance in the design image shown in type C, type B obtained higher WTP than type C, there is gap ($WTP_1B - WTP_1C$) as much as IDR 1,273.

Table 4-18 Image and explanation of Type B and C

Type	Stage 1		Stage 2	
	Image	Explanation	Image	Explanation
B		Function		Amenity
C		Function		Amenity

The design image shown in Stage 2 for both type B and C are same. In type B, the images shown in first and second stage are same as in Stage 1, meanwhile in type C the image shown in Stage 2 shows more amenities. The change of images in Type C give surprise to the respondents, therefore the WTP of type C in Stage 2 (WTP_2C) is IDR 694 higher than type B (WTP_2B). Nevertheless, the median WTP show differently, even though there is change of image in the second stage, the median WTP of type C (Median WTP_2C) is lower than type B (Median WTP_2B) with gap as much as IDR 432. This result means that the change of image did not much considered by half of the respondent, meanwhile the other half of the respondent valued higher on the second image.

Figure 4-23 Illustrates that there are amenity values includes in the valuation of type B in Stage 1. Even though the explanation is Function aspect, compares to type C, the design image in the questionnaire of type B shows more amenities, and type B (WTP_1B) obtained more WTP than type C (WTP_1C). Therefore, the gap between WTP of type B and type C in Stage 1 ($WTP_1B - WTP_1C$) as much as IDR 353 is considered as value of amenity without explanation.

In Stage 2, the image shown are same, however, WTP of type C (WTP_2C) obtain higher than type B (WTP_2B) as much as IDR 694. While in type B the design image in both stages remains the same, the design image in Stage 1 and Stage 2 of type C is changed. The difference of WTP in type B (WTP_2B) and type C (WTP_2C) is caused by the change of image in type C. Thus, the value of the extra WTP ($WTP_2C - WTP_2B$) is considered as “surprise” value.

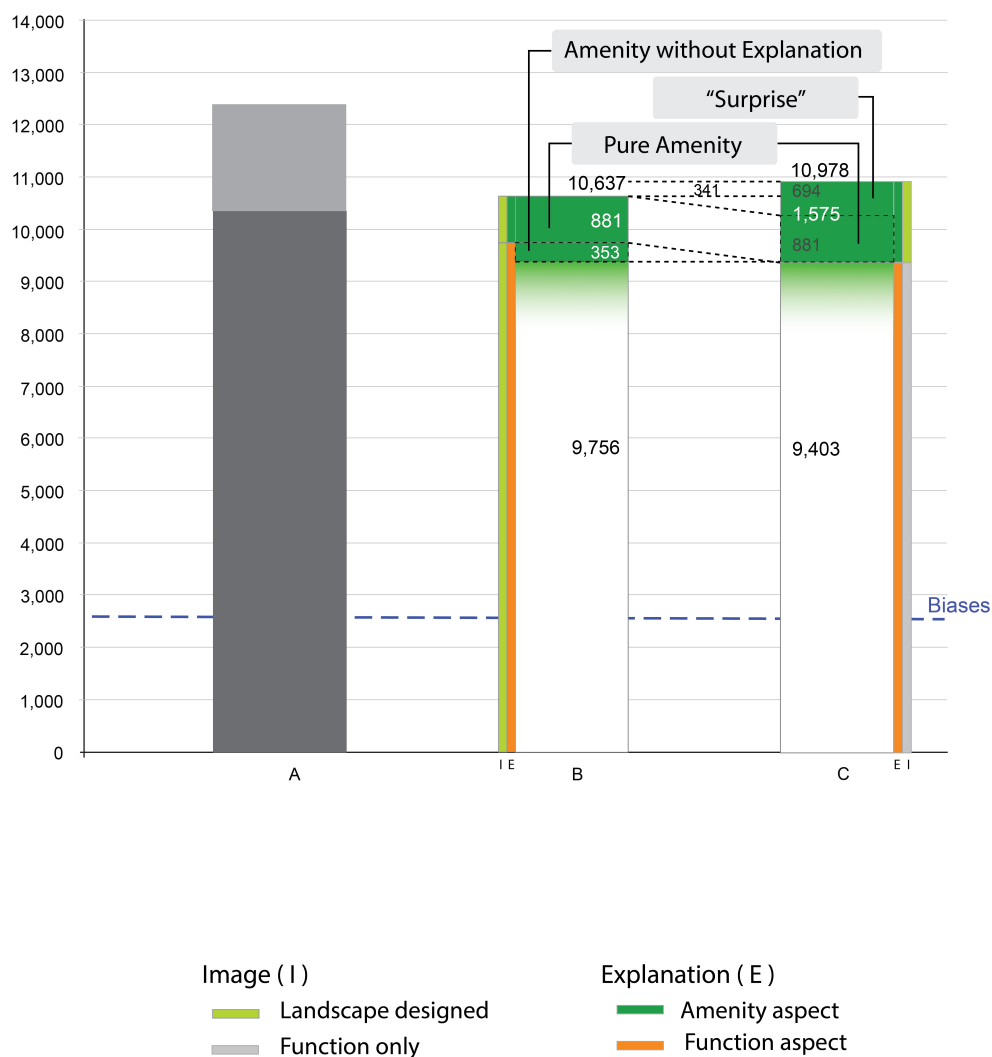


Figure 4-23 Mean WTP of Type B and C

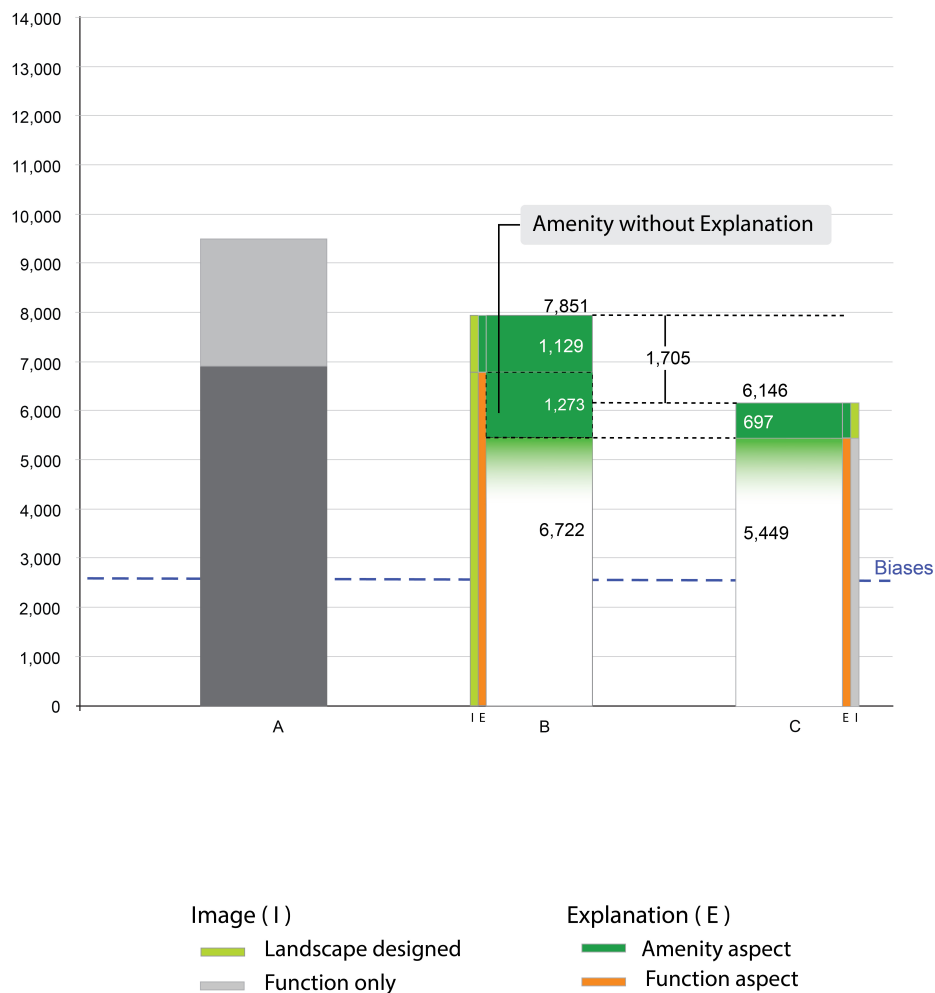


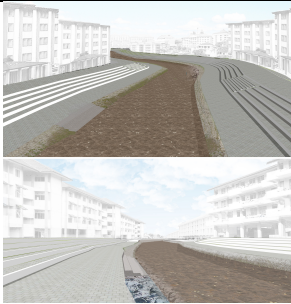
Figure 4-24 Median WTP of Type B and C

4.4.3. Type A and C

The order of explanation of the design in both types are different, besides, it is also show different images in Stage 1. In Stage 1, type A questionnaire explained Amenity aspect and also showed the image with more amenities, then explained Function aspect in Stage 2 with the same image. In the other hand, type C questionnaire is explained the design in reversed order in which Function aspect is explained first then followed by Amenity aspect. Image used for valuation of type C questionnaire is shows fewer amenities and highlights the structure.

In Stage 1, Mean WTP of type A (WTP_1A) is higher than type C (WTP_1C), with gap ($WTP_1A - WTP_1C$) as much as IDR 957 (see Figure 4-25). This gap is influenced by the difference of image and explanation, which express that in the first stage, Amenity aspect is perceived higher than Safety aspect. In Stage 2, WTP of type A (WTP_2A) is also higher than type C (WTP_2C), with gap ($WTP_2A - WTP_2C$) as much as IDR 466. Compare to comparison between questionnaire type A and B (see Section 4.4.1), the gap between type A and type C in Stage 2 is fewer due to ‘surprise’ value in type C.

Table 4-19 Image and explanation of Type A and C

Type	Stage 1		Stage 2	
	Image	Explanation	Image	Explanation
A		Amenity		Function
C		Function		Amenity

Comparison of WTP between type A and type C express the same pattern with the comparison between type A and type B (see Section 4.4.1). In Stage 1 type A is obtained higher WTP than both type B and type C. Likewise, in Stage 2, WTP of type A is also higher than both type B and type C. This similar pattern indicates that type A has better way to obtain higher WTP, in terms of order of explanation and design image presentation. However, due to the difference in both order of explanation and image, values included in the valuation cannot be determined from this comparison.

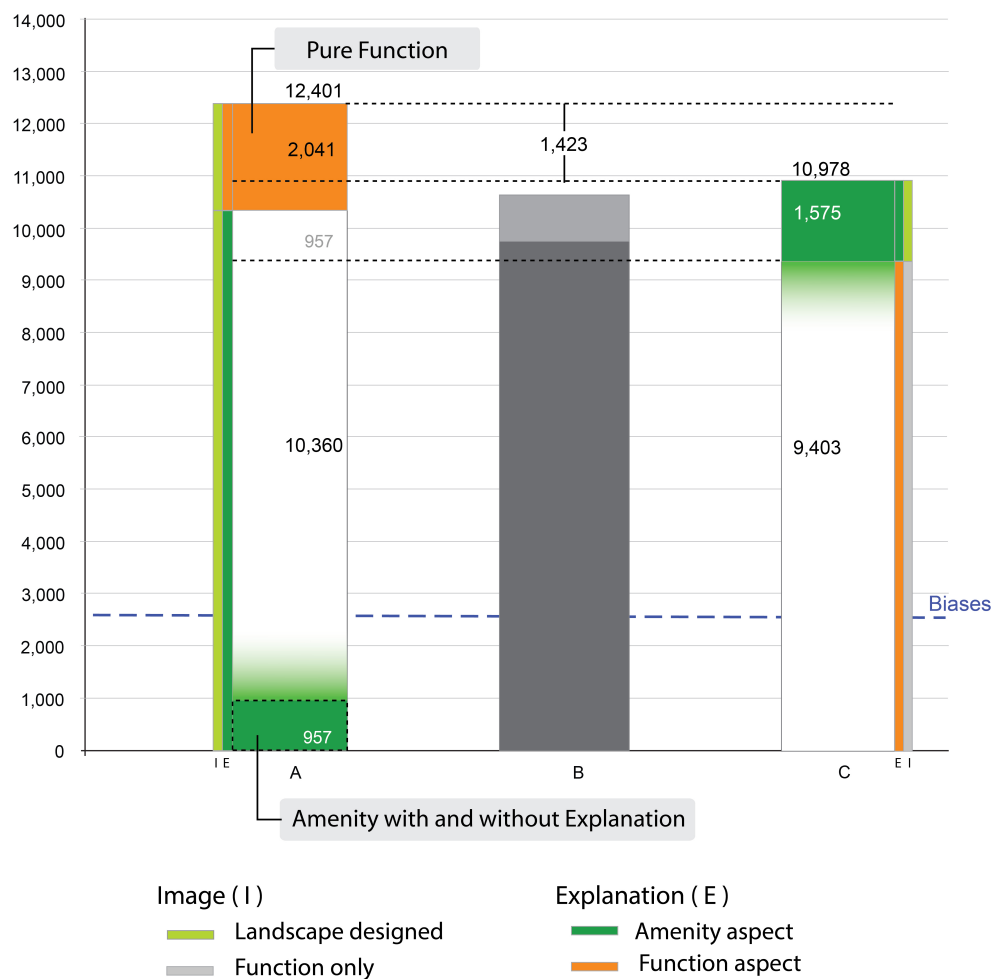


Figure 4-25 Mean WTP of Type A and C

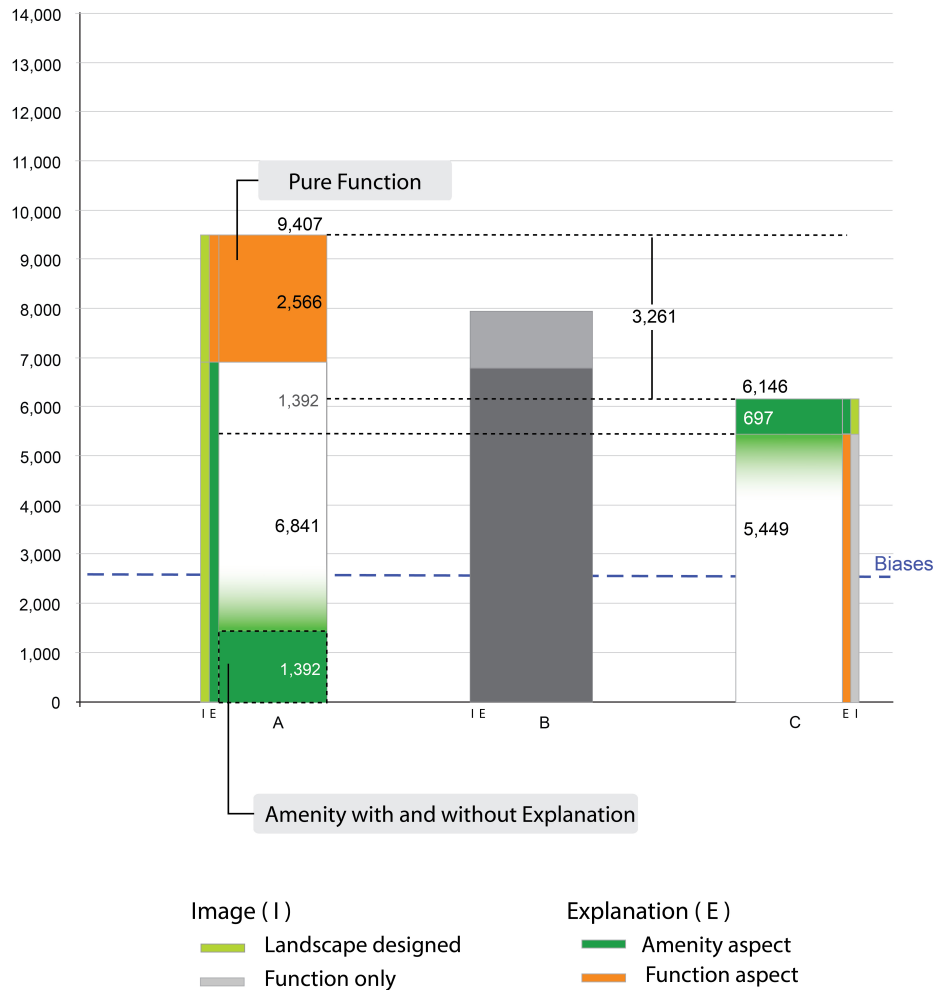


Figure 4-26 Median WTP of Type A and C

4.4.4. Type A, B and C

This research is using CV method in 2 (two) stages in purpose to understand the influence of knowledge towards the design by measuring through valuation. There are two aspects being valued in this study, namely Amenity and Function. Each stage explained different aspect of the design and asked the respondent for their willingness to pay (WTP), then identify whether there is changes between Stage 1 and Stage 2. Questionnaire type A and B is designed in purpose to investigate the influence of order of explanation. In the other hand, type C is designed to investigate the influence of the different image.

Table 4-20 Image and order of explanation in the questionnaire

Type	Stage	Image	Explanation
Type A	Stage 1	Landscape designed	Amenity
	Stage 2	Landscape designed	Function
Type B	Stage 1	Landscape designed	Function
	Stage 2	Landscape designed	Amenity
Type C	Stage 1	Function only	Function
	Stage 2	Landscape designed	Amenity

As summarize from the comparisons elaborated in previous sections, Figure 4-27 shows the results of three valuations done in this study. In Stage 1, Amenity aspect is more dominant in influencing the WTP. As can be seen from the gap between Type A (WTP_1A) to Type B (WTP_1B) and to Type C (WTP_1C). It is because Type A explained the Amenity aspect, meanwhile design image of Type B shows more amenities than Type C.

$$WTP_1A > WTP_1B > WTP_1C$$

From the graph of Type A (WTP_1A), compares to Type B (WTP_1B) and type C (WTP_1C), it indicates that explanation (E) has bigger influence to WTP than image (I). It can be seen from the value of amenity with explanation that obtained bigger value (IDR 604) than the amenity without explanation (IDR 353).

$$E > I$$

Furthermore, in Stage 2 the information (explanation and image) given are same, in which Amenity aspect and Function aspect are both explained, but the total WTP (WTP_T) of each types are different. It is noticeable that Function aspect is more considered than Amenity in determining WTP, as Type A (WTP_2A) obtains higher WTP in Stage 2 compares to Type B (WTP_2B) and Type C (WTP_2C). At the same time, Type B (WTP_2B) is lower than Type C (WTP_2C) due to the “surprise” value included in Type C.

$$WTP_2A > WTP_2B$$

$$WTP_2A > WTP_2C$$

$$WTP_2B < WTP_2C$$

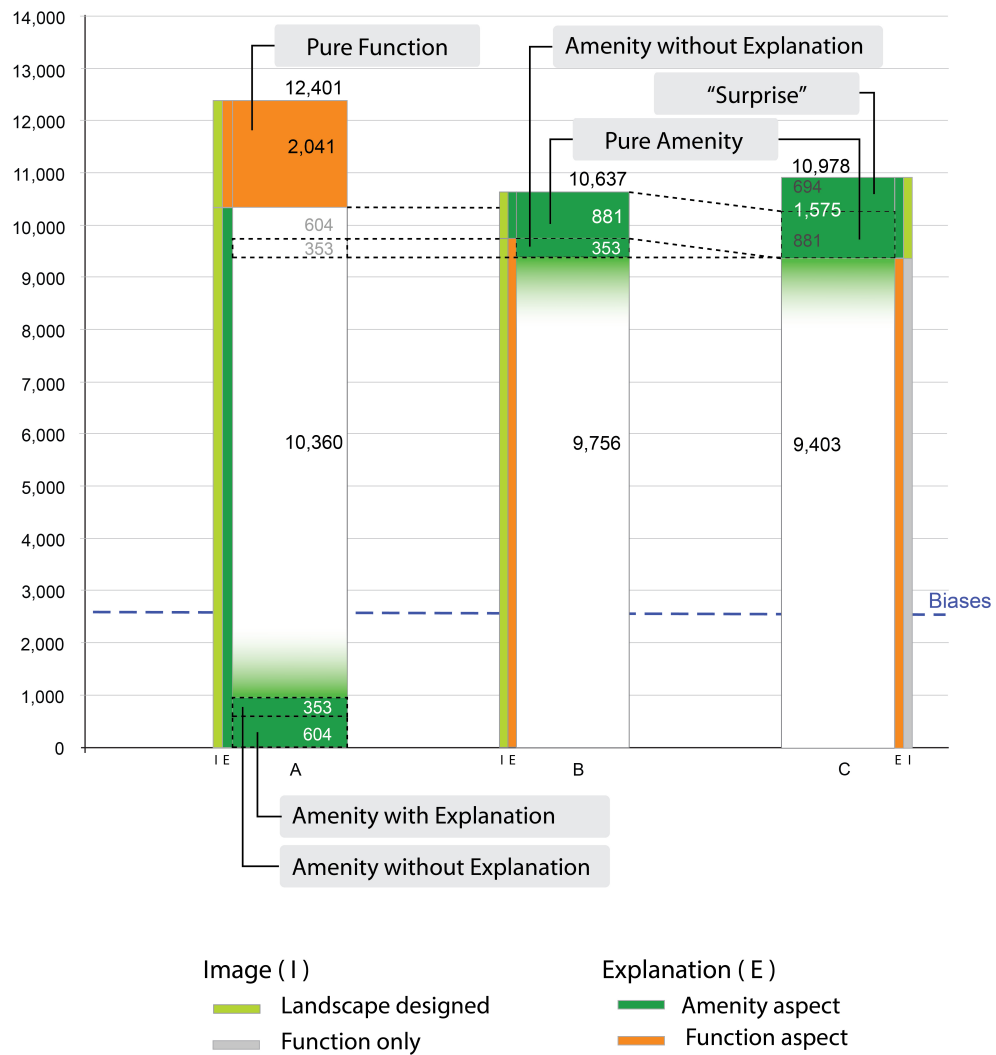


Figure 4-27 Mean WTP of Type A, B, and C

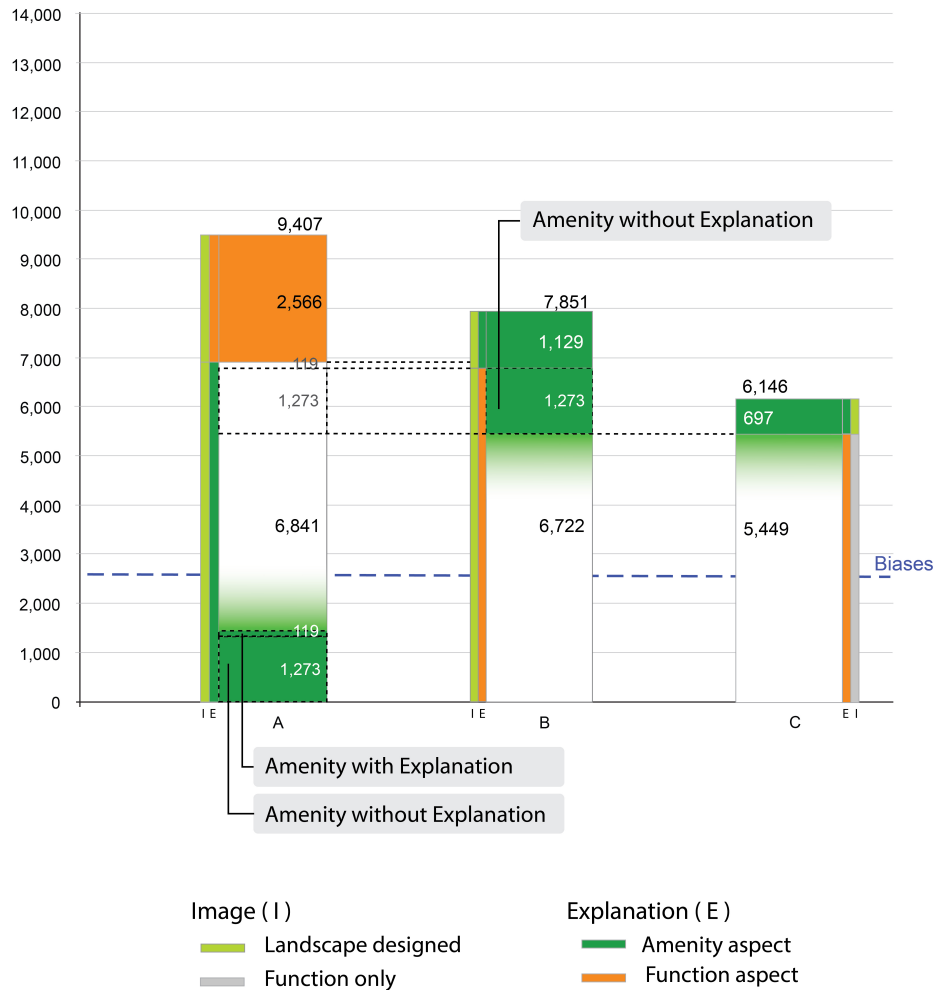


Figure 4-28 Median WTP of Type A, B, and C

4.5. Factors influencing willingness to pay response

The following sections elaborate determinants of WTP response. There are three groups of variable are present to analyze WTP determinants, they are reasons of WTP response, socio-demographic variables and attitudinal variables. WTP determinant is important to find the tendency of respondents' consideration in response to WTP, whether the respondent is agree or disagree to pay the offered amount.

4.5.1. Reasons of WTP response

There are nine questions were asked to the respondent to investigate their reason of WTP response. The questions includes:

- | | |
|---|--|
| 1) Preference | I do not satisfied with the existing condition, I like the proposed design |
| 2) Importance to improve riverside area | I agree to use the tax to improve the landscape, and the tax should be used for improving riverside area |
| 3) Importance to use additional tax | The design should be adopted, and it is important to use the additional tax |
| 4) Affordability | The design should be adopted, and I can afford to pay the additional tax |
| 5) Responsibility | It is the responsibility for the people living in Yogyakarta City to pay for improving the landscape |
| 6) Suitability | The design is suitable to the riverside area in Yogyakarta City |
| 7) Economic and tourism value | The design may affect the regional economy and tourism in Yogyakarta City |
| 8) Natural and cultural value | The design enhance the natural and cultural value of the riverside area in Yogyakarta City |
| 9) Inheritance value | I want the next generation to have better riverside and use the design |

Then, the answer is measured through Likert scale of agreement, from -2 to 2;

Very disagree	Disagree	Neutral	Agree	Strongly agree
-2	-1	0	1	2

Result of the measurement is statistically analyzed by calculating their arithmetic mean and bivariate test to WTP.

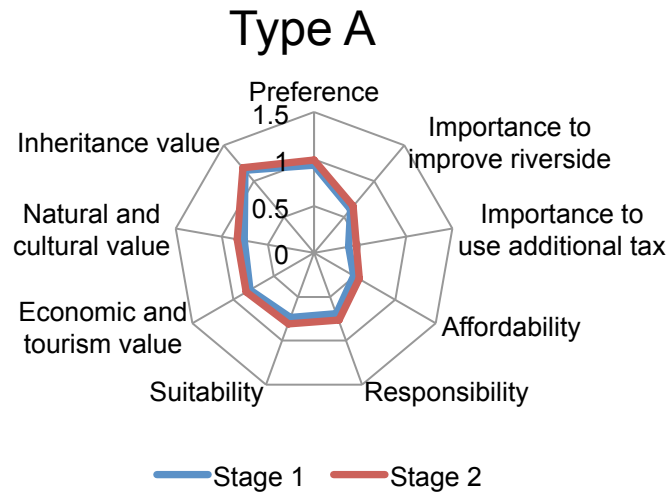


Figure 4-29 Reason of WTP response of Type A questionnaire

Type A questionnaire is explained amenity aspect first then followed by function aspect. The reason of response has resulted similar pattern between Stage 1 and Stage 2. Inheritance value obtained the highest value, it means that the respondent want the riverside improvement project by considering the future generation. In contrast, importance to use additional tax obtained the lowest, followed by affordability. This result indicate that financial issue is become the main concern in participating in development project.

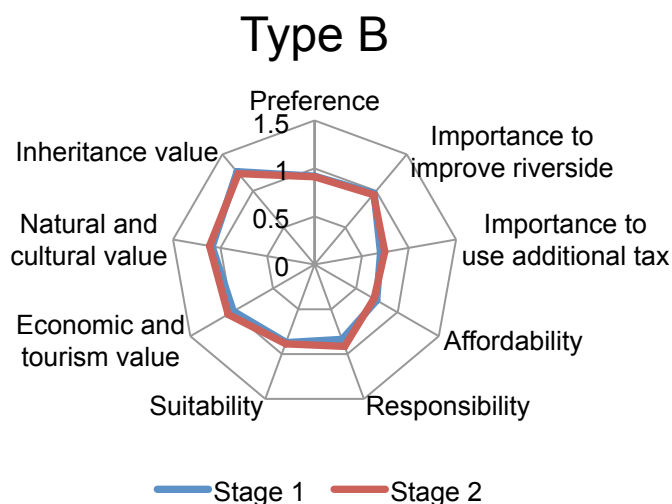


Figure 4-30 Reason of WTP response of Type B questionnaire

Type B questionnaire is performed the reversed order of explanation from Type A. Type B questionnaire explained function aspect first then followed by amenity aspect. Type B questionnaire resulted the similar pattern to Type A questionnaire, in which financial issue becomes the concern. It is represent in the low mean for importance to use additional tax and affordability variable. However, inheritance variable still become the highest value. In addition, natural and cultural value also obtained mean more than 1, it means that the respondents consider the design may enhance natural and cultural value of the riverside area. Economic and tourism value also obtained more than 1 in average that indicated that the respondents perceived that economic and tourism may boosted by applying the design.

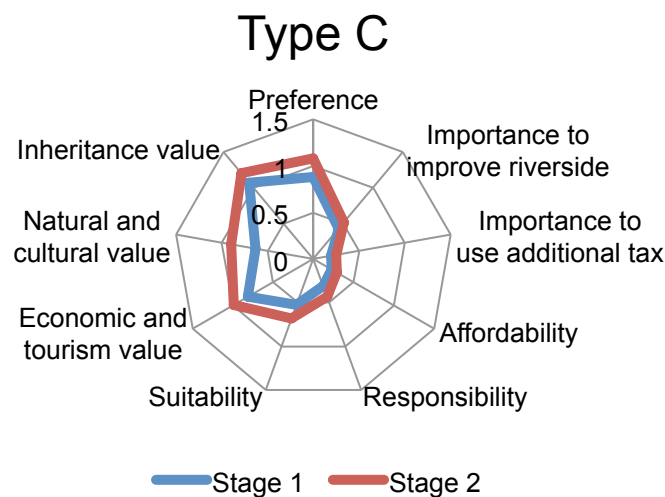


Figure 4-31 Reason of WTP response of Type C questionnaire

Type C questionnaire performed the same order of explanation as Type B that is explained function aspect first then followed by amenity aspect. The result of reason of WTP reason is relatively similar to Type A and Type B, in which importance to use additional tax and affordability variable obtained lowest mean. In the other hand, Preference and inheritance variable obtained the highest mean. There is a noticeable change in variable of natural and cultural value, which is the mean value is significantly changed. It is occurred due to the change of image in Stage 2 in the questionnaire that displays more amenity features.

Furthermore, bivariate analysis is also performed to find the correlation between the reasons of WTP response to WTP (see Table 4-) . Reasons of WTP response are positively influence WTP, which means that the WTP is increased as the reason is increasing the value. Among the nine reasons, there are reasons that has stronger influence to WTP; importance to improve riverside area, importance to use additional tax, affordability and responsibility.

Table 4-21 Correlation of reasons of WTP response to WTP

Factor	Correlation	
	Stage 1	Stage 2
Preference	.221**	.158**
Importance to improve riverside area	.511**	.452**
Importance to use additional tax	.495**	.451**
Affordability	.536**	.439**
Responsibility	.413**	.335**
Suitability	.216**	.208**
Economic and tourism value	.189**	.119**
Natural and cultural value	.178**	.123**
Inheritance value	.264**	.175**

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

4.5.2.Socio-demographic variables

Socio-demographic variables as WTP determinant are analyzed to find the WTP consideration by the respondents' socio-demographic background. The result of bivariate analysis shows that age, sex, marital status, house ownership and living duration have negative correlation with WTP. Meanwhile, education, income, household size, and income person in household has positive correlation with WTP. Age, education, income and living duration has stronger correlation with WTP than the other variables.

Table 4-22 Correlation of socio-demographic variables to WTP

Factor	Correlation	
	Stage 1	Stage 2
Age	-0.062	-.070*
Sex	-0.012	0.002
Marital status	-0.046	-0.037
Education	.106**	.137**
Income	.158**	.154**
Household size	0.012	0.027
Income person in household	0.001	0.003
House ownership	-0.023	-0.015
Living duration	-.081*	-.109**

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

4.5.3. Attitudinal variables

Attitudinal variables represents the attitude of the respondents is influencing the WTP response. Table shows that distance to closest river has stronger correlation with WTP than the other variables. Furthermore, distance and donation has positive correlation with WTP. While, frequency of visit, flood experience and flood estimation has negative correlation with WTP.

Table 4-23 Correlation of attitudinal variables to WTP

Factor	Correlation	
	Stage 1	Stage 2
Distance	.083*	0.057
Frequency of visit	-0.032	-0.021
Flood experience	-0.066	-0.061
Flood estimation	-0.036	-0.047
Donation	0.003	0.023

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

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Chapter 5

Discussion

5.1. Influence of knowledge to valuation

The main purpose of this study is to investigate the importance of knowledge in building people's perception towards a design of public facility. Perception of the design is measured in monetary terms through contingent valuation method (CVM). Valuation of public spaces and public facilities has been done in previous studies (Ahmed and Gotoh, 2006; del Saz Salazar and García Menéndez, 2007; Lee, 2015, Song et al, 2015; Latinopoulos, 2016; Lee and Yoo, 2016; Verbič et al, 2016). Some findings showed positive correlation between education and WTP (Brunson and Reiter, 1996; Jim and Chen, 2005; Lee and Yoo, 2016; Latinopoulos, 2016), however it does not explain how knowledge is influencing the valuation. Therefore, this study carried out 2-stage CVM to analyze the influence of knowledge to the valuation.

There is possibility that the object of valuation is not familiar to the respondents, therefore, it is necessary to describe the scenario accurately to the respondents so it can enhance the credibility of the survey and reliability of the results (Arrow et al., 1993; Kwak and Yoo, 2015; Lee and Heo, 2016). In this study, CVM test began with building knowledge of the respondents by explained 1) the current situation and urgency of development and 2) features of the proposed design.

There are three CVM tests are executed in this study. Each of CVM test provide the value of riverside landscape design perceived by the respondents as result of WTP estimation. The three of them then compared to analyze how the method of delivering the information is affect the valuation.

WTP estimation results considerable amount in monetary term (see Table 5-1) that is reflects the importance of the proposed project as it is indicated the economical benefits (Ahmed and Gotoh, 2006; Lee, 2015; Song et al, 2015), in this case is the redevelopment of riverside landscape. Thus, the policymaker should take this result in to consideration in planning of the city development as economic feasibility study (Lee and Yoo, 2016), particularly in the riverside area. Furthermore, it can also be utilized to determine tariff or other revenue generation policy (Fujita, 2005).

Table 5-1 Result of WTP estimation (in IDR)

	Type A	Type B	Type C
Total mean WTP	12,401	10,637	10,978
Aggregate WTP	19,725,030,600	16,919,212,200	17,461,606,800
1 JPY = 116 IDR, 1 USD = 13,227 IDR (2015)			

Results of two-stage CVM test become the empirical evidence of the hypothesis that knowledge is influencing the valuation. It shows that there is a significant change of WTP following the additional explanation of the design (Stage 1 to Stage 2). It indicates that if there is more knowledge of the design provided, the value of the design will increase simultaneously. Ajzen et al (1996) discovered that it is related to the respondent's relevance to the scenario that CVM study delivered.

In order to increase benefit of the project, it is important to provide more knowledge of relevant economic values of the project to the beneficiaries (Ajzen and Driver, 1992), therefore they could convert their impression value into monetary value realistically. Direct communication to the people through community meetings can also applied to imparting knowledge. Through persuasive communication, receiver's attitude could be guided to the suggested direction (Ajzen et al, 1996). Consequently, even though it may take longer time and more cost, the benefit generated by the increasing value may surpass the cost. This concept can also applied to other public goods.

Moreover, development of a public space, especially in riverside area is prone to bottleneck due to lack of understanding towards the project. This circumstance is furthermore lead to rejection or protest. Therefore, in order to increase acceptance, it is important to increase the knowledge through public education programs beside the public participation approach (Jim and Chen, 2006).

Beside knowledge of the design or plan, knowledge of the ideal state must be delivered to public to avoid misconception. The ideal state is the right knowledge that becomes the fundamental to people to understand the discussed issue in correct way. A misconception towards an issue, especially related to provision of public facility, which could increase welfare, will leads to disadvantage in the future.

Collaborative method is considered more sustainable (Fathani and Legono, 2012), in this context, collaboration with community-based organizations (CBO). Soemardiono and Gusma (2014) found that river-concerned CBO in Yogyakarta City is a potential to take into riverside planning. CBO helps in increasing knowledge through their activities in more understandable way to the local people. Delivery of the knowledge can be done through personal persuasive, cultural, non-formal education or real action/example. This approach can be also applied in other areas with social capital that relatively high.



Figure 5-1 Activities of river-concerned CBO; ‘river school’ as public lecture platform (left) and ‘mertu kali’ as cultural approach for raising awareness toward the river (right)

Source: Group Code Boyong, kanaljogja.com

In addition, mass media can also be used to spread the knowledge. Mass media has power to lead the public perspective towards an issue. Therefore, utilization of mass media to educate people is also effective. However, it is necessary to control over the media in order to not disseminate the wrong knowledge to public. Figures and organizations that concern in river development should continuously contribute in delivering the right knowledge to public through mass media. Nowadays, social media in the internet can also be utilized for delivering knowledge in complementary to mass media.

Application of 2-stage CVM in this study was satisfied the purpose of the research that can be used to investigate the influence of knowledge to the valuation. Conventional CVM estimated the total WTP at once, and typically could not distinguish the value of its attributes. Through 2-stage CVM, it can identify the value of Stage 1 and Stage 2, in which each stage delivered the knowledge of different aspect. However, the value of each aspect could not be distinguished precisely. In addressing this problem, Kuriyama (1999) introduced Repeated Dichotomous Choice CVM (DCCV method). DCCV method can be

alternative to determine the value of a good or a public good by applying CVM, other than choice experiment (CE) method.

The result of this study shows that WTP of Stage 1 includes mixed values implicitly, it is contain the value other than those explained. People may answer the value with consideration other than the certain aspect of the design explained. It is implies that without any explanation they value the design to some extends. In addition, with more specific information regarding the design provided, the value is increased.

Beside the mixed values, several biases also occurred in Stage 1. Starting point of a bidding game may be bias in stating the WTP of the respondent due to its tendency to guide the respondents' estimation (Brookshire et al, 1976). Starting point bias could affect to the valuation due to consideration of the affordability of the respondents responding the amount offered in the bidding game. Fujita (2005) found that there is gap between the value of WTP derived from CVM survey with the value that the respondent can actually pay for the proposed good or service, it is called "budget constraint". Therefore, it is important to consider the affordability of the user or community beside the results of CVM test for determining pricing policy in order to prevent inequity of access to the goods or services (Shono et al, 2014).

In addition, information bias may also occurred, especially to those who unfamiliar to the presented topic (Ajzen et al, 1996). Information provided may affect to their perception of value towards the proposed design. The estimation could be exceed their true WTP or otherwise.

In stage 2, information provided is same in all types of questionnaire, that is both amenity and function aspect is explained. Nevertheless, the total WTP value of each type is different. The difference of total WTP value is caused by the different order of explanation. In terms of delivering the information, explaining the amenity feature in first stage is valued higher than those explaining the function aspect first. As a strategy, this order of explanation (amenity then function) will result higher benefit than the reversed order. Therefore, order of information can be considered as bias to the valuation.

Yet, in terms of adding more money to the project, which was examined in Stage 2, the result shows that function aspect is valued higher than amenity aspect. The respondent tends to increase their WTP value after the explanation of function aspect in Stage 2. It is implies that in order to redevelop the riverside area, people would like to invest more to function rather than amenity.

5.2. WTP determinant

Reasons of willing to pay are all positively related to WTP, reason of importance to improve riverside area, importance to use additional tax, affordability and responsibility are strongly related compared to the other reasons. Thus, it is indicated that people behavior towards the riverside area is influencing the value, specifically related to their financial state. This indication is interconnected with socio-demographic and attitudinal background.

WTP is positively related to education and income, it supports the finding in previous researches (del Saz Salazar and García Menéndez, 2007; Yang et al, 2008, Yoo and Kwak, 2009). Education level influences the value of a riverside design due to their reference of the ideal state of a riverside area. While relationship with income means that valuation is influenced by consideration of ability to pay. Education level and income also positively related to each other, it means that people with higher education could afford the WTP because they earn higher income. Hence, the importance of higher education program is necessary.

In the other hand, age and living duration are negatively related to WTP, it is indicated that younger people valued higher to the design, it is also found that age related negatively with education. Younger people may have higher education level than the older people. Meanwhile, people living longer in the city may familiar with the current state and feels satisfied enough with the existing condition.

Distance is positively related to WTP, this result is contrary to conventional relationship between distance and WTP in CV studies (Pate and Loomis, 1997; Fujita 2005). In this study, WTP is increase as we go further from the river. This indicated that the people living closer to the river are less likely willing to pay than those who live further. This is related to their economic condition, in which people living close to river are mostly low-income families, or this people are afraid that the project may affect their house. Higher WTP gained from people living further shows that the redevelopment of riverside area are demanded by broader community, not only riverside residents.

Current condition of the study object, riverside areas in Yogyakarta City, is not a preferred place to visit by non-residents. It is reflected in their impressions towards the existing condition (see Figure 4-16) that the evaluation is relatively low. In contrast, the proposed design is evaluated higher. Improvements of landscape that illustrated in the proposed design provide new insight for future development of the area, so that people could imagine the benefits they might obtain from the development.

Relationship between frequency of visit, flood experience and flood estimation are negative to WTP. Related to distance, riverside residents are frequently visiting the area, experience flood and estimate high for likelihood of future floods. People living along the riverside area is developed their coping capacity towards the disaster risks, in this term is flood disaster. Texier (2008) noticed that the behavior and coping strategies of the people are related to daily and non-hazard constraints, as they are marginalized geographically, socially, economically and politically not due to low perception of risk. Fears of displacement may take part in the consideration in valuing the design, since it will affect directly to their properties. In this regard, value resulted from CVM study cannot straightly used for tax or pricing policy because it cannot compare to the cost for the whole process, such as compensation, construction and maintenance. CVM result can be utilized to measure the intangible benefit of the public goods or service.

Additionally, although it is not significant, donation is positively related to WTP. So that this behavior is positively influence the WTP. People who donated for public interest are likely to give more WTP in valuation.

WTP determinant should not only analyze the direct correlation between the variables to WTP. It is important to analyze the causal relationship between variables to understand deeper consideration from multiple perspectives. Therefore, the comprehensive understanding towards the issue can be covered, and then the core problems can be addressed.

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Chapter 6

Conclusion and Recommendation

1) Method of delivering information and image affects willingness to pay (WTP)

The application of 2-stage CVM in this study could reveal that knowledge is influencing the valuation. The influence is reflected in increasing value of WTP following the information provided. However, this method is prone to bias regarding the order of delivering information. As a strategy to promote the goods or services, the features that are visually obvious, such as amenity, should inform in the beginning then followed by the function features. Thus, the user could perceive the value of the goods or services higher. It can be applied not only for public goods, such as public spaces or facilities but also commercial goods or services.

2) Values clarified through CVM study serves as feasibility study

Policy maker should consider the result of CVM study, especially for pricing decision. Values clarified from CVM study can be considered as feasibility study to observe the public acceptance towards the proposed design or plan. However, the value could not used to determine tax or price since it is just a reflection of intangible benefit of the development, not include the actual cost of the project.

3) 2-stage CVM limitations

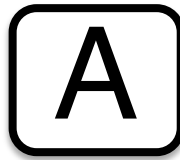
However, 2-stage CVM reveal the weakness of the method that even though it can separate the value of each stage, it is could not used for distinguish the value of each aspect precisely. Choice experiment is more efficient to investigate the value of each attributes of a public good. Value determined through CVM test in this study clarified the aspect that is more or less considered by the respondents as beneficiaries. Thus, it can be utilized for prioritizing the focus of development.

4) Significance of improving knowledge to increase value of public facility

Rejections and social bottlenecks of the planned development are usually occurred due to lack of understanding toward the discussed issue. Findings indicated that increasing knowledge is important to increase benefit of the development. In this regard, it is necessary to provide more information to imparting deeper understanding. Instilling the right knowledge toward the discussed issue in ideal state become fundamental to increase people's understanding in a right way.

Information should be delivered by explain the necessity and the advantage that will provided by the development. Therefore, this study recommends integrating and prioritizing programs that could increase knowledge into the planning process, as important as developing worthy planning. Increasing knowledge can be done through direct communication, collaboration and educational programs. Community-based approach seems more efficient, especially for the society that has high social capital. Therefore, the knowledge could be delivered in more explicable. Moreover, involving the community into the planning process could ensure the sustainability due to their participation. Besides, utilization of mass media can also effective to deliver knowledge due to its power in leading public opinion.

Regarding riverside landscape design, riverside area as a buffer zone should be clearly defined and protected to give space for natural ecology and river activities. In the other hand, development of settlements should not interfere the natural dynamics of the river. By increasing the quality of the environment, it can improve the quality of life. The significance of preserving the natural environment as well as mitigating disaster risks should be communicated in understandable approach to the beneficiaries. Hence, the acceptance and benefit of the riverside landscape improvement could be increased and all stakeholders will not feel disadvantaged because of the development.



Respondent code:

Interviewer:

Questionnaire for research:

“Economic Evaluation for Riverside Landscape Design Considering Amenity and Disaster Mitigation, Case Study: Yogyakarta, Indonesia”

This research is performed under the guidance of Laboratory of Urban and Landscape Design, Department of Civil and Earth Resources Engineering, Graduate School of Engineering, Kyoto University – Japan

This research aims to determine citizen's perception about the designs of riverside area in Yogyakarta City. The designs will be examined through valuation of the citizen's impression to the design, in which the value of impression is converted into value of money.

In this research, there is a design of riverside area in Yogyakarta City will be examined.

The questionnaire may take approximately 20 minutes to answer the questions.

This questionnaire is ONLY for people who currently living in Yogyakarta City.

Information in the questionnaire will be for scientific purposes only and will not be used for other than that.

This research will process and analyze your answers statistically, therefore, we will keep your identity anonymous and it will never occur that your personal information is identified.

Please reply the questionnaire as family representative.

Thank you very much for your kind cooperation to fill the questionnaire despite your busy schedule.

Contact

Researcher : Atrida Hadiani
Phone : +62 817 463129
E-mail : atridahadiani@gmail.com

Laboratory of Urban and Landscape Design, Department of Civil and Earth Resources Engineering, Graduate School of Engineering, Kyoto University – Japan

<PICTURE 1>

There is a design of the riverside area in Yogyakarta City to be examined in this research.
The design is an improvement over the existing conditions.

Design Evaluation

<PICTURE 2>

20. Please imagine that you will do activities in this place, what kind of activities do you think attractive to do in this place?
(You can choose more than one)

- ☐ Walk
- ☐ Sit/relax
- ☐ Eat and drink
- ☐ Chat
- ☐ Fishing
- ☐ Play close to water
- ☐ Occasional use (festival, etc)
- ☐ Other, mention: _____

21. In your opinion, the place in the image above is...
(Choose one that is expressing your opinion of the image the most in -2 to 2)

Unattractive	☐ -2	☐ -1	☐ 0	☐ 1	☐ 2	Attractive
Artificial	☐ -2	☐ -1	☐ 0	☐ 1	☐ 2	Natural
Dirty	☐ -2	☐ -1	☐ 0	☐ 1	☐ 2	Clean
Narrow	☐ -2	☐ -1	☐ 0	☐ 1	☐ 2	Spacious
Dangerous	☐ -2	☐ -1	☐ 0	☐ 1	☐ 2	Safe

<PICTURE 3>

22. Please imagine that you will do activities in this place, what kind of activities do you think attractive to do in this place?
(You can choose more than one)

- ☐ Walk
- ☐ Sit/relax
- ☐ Eat and drink
- ☐ Chat
- ☐ Fishing
- ☐ Play close to water
- ☐ Occasional use (festival, etc)
- ☐ Other, mention: _____

23. In your opinion, the place in the image above is...
(Choose one that is expressing your opinion of the image the most in -2 to 2)

Unattractive	☐ -2	☐ -1	☐ 0	☐ 1	☐ 2	Attractive
Artificial	☐ -2	☐ -1	☐ 0	☐ 1	☐ 2	Natural
Dirty	☐ -2	☐ -1	☐ 0	☐ 1	☐ 2	Clean
Narrow	☐ -2	☐ -1	☐ 0	☐ 1	☐ 2	Spacious
Dangerous	☐ -2	☐ -1	☐ 0	☐ 1	☐ 2	Safe

Willingness to Pay (WTP)

This section aims to examine the value of the riverside landscape design in Yogyakarta City.

There are assumed project of construction will be given, and it is NOT associated to actual policies or plans.

Suppose there is plan for redevelopment the riverside area in Yogyakarta City to improve the existing landscape.

There is a design proposed to be adopted to the project. The design improves the existing condition in terms of appearance and functions.

The pictures shown are image of typical scenery of the site.

The design will be applied along the riverside in both 3 (three) main rivers; Winongo, Code, Gajahwong. [<PICTURE 4>](#)

However, in order to execute and maintain the area according to design, it requires large amount of money.

In this case, all households in Yogyakarta City should devote to pay additional tax starting from 2016.

All households living in Yogyakarta City will pay the same amount every year during their living in Yogyakarta City.

Part 1 – Amenity

Dense settlements that grew in the border area these rivers causes various environmental problems, namely garbage and domestic waste.

Green open space in the area is very limited, whereas the riverside area supposed to be conservation area to maintain the natural ecosystem of the river.

If there is a redevelopment of this area, there will be a significant environmental degradation leading to problems that result in adverse impacts not only on the communities living along the river, but also the people of the city.

Please answer the following questions in the viewpoint of AMENITY of the riverside area. Please value ONLY the development of the riverside, water quality and buildings is not include in this valuation.

Existing <PICTURE 5>

- High density housing that is very close to river mouth
- The settlement grows unplanned and looks dirty
- There is no sufficient green open space

Design <PICTURE 6>

- Distance between housing and river edge is widenend to 15 meters, 5 meters used for promenade and the rest 10 meters used for park area
- The park can be utilized as public space for many recreational and outdoor activities, from relaxing, picnic, sport and occasional use (festival, etc).
- The park is also used as natural preservation
- Green open space attached is expected to restore natural ecosystem, reduce air pollution and urban heat island

24. By comparing the image of the Existing and Design as in the image above, do you agree with the project for amenity improvements of the riverside area?

Please answer the question by consider ONLY the development area (inside the red line), any properties other than the development area should not be considered.

- ☐ Yes
☐ No

<PICTURE 7>

25. Compare to Existing, would you pay for the development of riverside in 3 (three) rivers in Yogyakarta City as additional tax **Rp.1,000 /month (Rp.12,000 /year)**? (WTP 1-1)

Please mind that if the amount of tax is increased, your family income will be decreased.

- ☐ Yes (6-1)
☐ No (6-2)

6-1[Yes]
If **Rp.2,000 /month (Rp.24,000 /year)**, would you pay?
☐ Yes (YY)
☐ No (YN)

6-2 [No]
If **Rp.500 /month (Rp.6,000 /year)**, would you pay?
☐ Yes (NY)
☐ No (NN)

Total WTP 1-2

- ☐ YY 2,000
☐ YN 1,000

- ☐ NY 500
☐ NN 500

26. Why do you agree to pay additional tax for improving amenity of the riverside?
(Please answer by ticking the point that the most represent your opinion in 1 to 5)

	<i>Very disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly agree</i>
1. I do not satisfied with the existing condition, I like the proposed design	-2 O	-1 O	0 O	1 O	2 O
2. I agree to use the tax to improve the landscape, and the tax should be used for improving riverside area	-2 O	-1 O	0 O	1 O	2 O
3. The design should be adopted, and it is important to use the additional tax	-2 O	-1 O	0 O	1 O	2 O
4. The design should be adopted, and I can afford to pay the additional tax	-2 O	-1 O	0 O	1 O	2 O
5. It is the responsibility for the people living in Yogyakarta City to pay for improving the landscape	-2 O	-1 O	0 O	1 O	2 O
6. The design is suitable to the riverside area in Yogyakarta City	-2 O	-1 O	0 O	1 O	2 O
7. The design may affect the regional economy and tourism in Yogyakarta City	-2 O	-1 O	0 O	1 O	2 O
8. The design enhance the natural and cultural value of the riverside area in Yogyakarta City	-2 O	-1 O	0 O	1 O	2 O
9. I want the next generation to have better riverside and use the design	-2 O	-1 O	0 O	1 O	2 O
10. Improving environmental comfort important to be applied in the area of border river	-2 O	-1 O	0 O	1 O	2 O
11. I think the design has better building architecture	-2 O	-1 O	0 O	1 O	2 O

Part 2 – Safety

There are three main rivers flows crossing Yogyakarta City, namely Winongo, Code and Gajahwong, and both rivers are tipped from Merapi volcano. Merapi volcano produces large number of sediment volumes during the eruption period, which potentially transport to downstream in various mechanisms, among others through natural flow by bed transports and debris flows. The lava flow can occur triggered by rain, which is when rainfall is high during the rainy season, normally from November to April. These lava flows can reach speed between 57 m/s at 1000 meter in elevation. This lava flows is known as cold lava flood or “banjir lahar dingin” in Indonesian language. This kind of flooding, beside the regular urban or river flooding, might occur in every 4 – 6 years, depend on the volcanic activity. During and after the eruption event, rivers that tipped from Mt. Merapi may carry considerable amount of sediment generated by the volcano and flows with destructive power, among of those rivers Boyong/Code River and Kuning River (in east part of Yogyakarta) have higher potential to get struck by debris flow. The risk of cold lava flow is mainly threatened residents who live along the riverside, because the flow of cold lava can flooded neighborhoods, destroyed houses and buried all in the sand. Area within 20 meters from river edge is highly prone to this hazard.

There are several flooding events recorded in rivers in Yogyakarta due to debris flow within the last 25 years. The last Merapi eruption event in 2010 lead to massive sediment flow that cause flooding that reach 1.5 meters height in some riverbank and inundated more than 300 houses. Water and debris inundated the settlements 50 meter from the riverbank with depth of 1.25 meter, this event caused 800 residents evacuated.

<Picture of flood event>

Pictures above are sample of damage area affected by flooding. Other riverside areas has similar risk to flooding.

Therefore, with the aim of protecting the community from disasters and enhance the environment quality in the riverside, the redevelopment is necessary. There are 2 (two) designs proposed to improve safety in riverside area, each design has different level of protection to flooding. Ecological and water quality remain the same as before the redevelopment.

Assumed ecology and water quality remains the same as before.

Please answer the following questions in the viewpoint of SAFETY of riverside area.

The photos shown on the following questions are completely similar to the photos shown in the previous question.

Please value ONLY the development of the riverside, water quality and buildings is not including in this valuation.

Existing <PICTURE 8>

- Area within 1 - 1.5 meter from river edge
- Able to withstand 50 cm flood depth (by height, not by strength)
- If overflow occur, area behind the floodwall is highly risk to inundation

Design <PICTURE 9>

- Area within 15 meter from river edge
- Settlements is relocated into vertical housing and relocated behind the structure in order to reduce horizontal density, thus the land can be used for green open space in between the housing building
- Able to protect from the damage caused by flooding with discharge of 100 year return period flood*

With existing condition, this magnitude may cause overflowing water up to 1.5 meter height, and inundated the area more than 20 meter from river edge.

*100 year return period means the chance of occurrence is 1% in any given year

27. By comparing the image of the Existing and Design as in the image above, do you agree with the project for safety improvements of the riverside area?

Please answer the question by considers ONLY the development area (inside the red line), any properties other than the development area should not be considered.

- ☐ Yes
☐ No

<PICTURE 10>

28. Compare to Existing, how much you can pay for the development of riverside in 3 (three) rivers in Yogyakarta City as additional tax? Please answer the amount including AMENITY aspect (Price = Amenity + Safety)
(the price charged according to the price of WTP 1-2, see the options below)

WTP 2-1

- ☐ YY Rp.**5,000**/month (Rp. 60,000/year) ☐ NY Rp.**1,000**/month (Rp. 12,000/year)
☐ YN Rp.**2,000**/month (Rp. 24,000/year) ☐ NN Rp.**500**/month (Rp. 6,000/year)

Total amount is INCLUDING aspects of environmental comfort described in the previous question (4)
So, the price = + comfort environmental disaster mitigation

Please mind that if the amount of tax is increased, your family income will be decreased

- ☐ Yes (9-1)
☐ No (9-2)

9-1 [Yes]
 If the amount of **Rp. _____/month**, would you pay?
☐ Yes (YY)
☐ No (YN)
 *****Higher** than WTP 2-1, according with the table WTP 2-2 below

9-2 [No]
 If the amount of **Rp. _____/month**, would you pay?
☐ Yes (NY)
☐ No (NN)
 *****Lower** than WTP 2-1, according with the table WTP 2-2 below

Table WTP 2-2

/month	500	1,000	2,000	5,000	10,000	20,000	30,000
/year	6,000	12,000	24,000	60,000	120,000	240,000	360,000

Total WTP 2-2

29. Why do you agree to pay additional tax for improving safety function of the riverside?
(Please answer by ticking the point that the most represent your opinion in 1 to 5)

	<i>Very disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly agree</i>
1. I do not satisfied with the existing condition, I like the proposed designs	-2 O	-1 O	0 O	1 O	2 O
2. I agree to use the tax to improve the landscape, and the tax should be used for improving riverside area	-2 O	-1 O	0 O	1 O	2 O
3. The design should be adopted, and it is important to use the additional tax	-2 O	-1 O	0 O	1 O	2 O
4. The design should be adopted, and I can afford to pay the additional tax	-2 O	-1 O	0 O	1 O	2 O
5. It is the responsibility for the people living in Yogyakarta City to pay for improving the landscape	-2 O	-1 O	0 O	1 O	2 O
6. The design is suitable to the riverside area in Yogyakarta City	-2 O	-1 O	0 O	1 O	2 O
7. The proposed design may affect the regional economy and tourism in Yogyakarta City	-2 O	-1 O	0 O	1 O	2 O
8. The design enhance the natural and cultural value to the riverside area in Yogyakarta City	-2 O	-1 O	0 O	1 O	2 O
9. I want the next generation to have better riverside and use the design	-2 O	-1 O	0 O	1 O	2 O
10. Preventing the risk of disaster is important to be applied in the area of river border	-2 O	-1 O	0 O	1 O	2 O
11. I think the design improves water quality of the river	-2 O	-1 O	0 O	1 O	2 O

Disaster Risk

This section is to know your understanding about the risk

30. Have you experience river floods?

- ☐ 1) Yes (*skip to 12*)
- ☐ 0) No (*skip to 14*)

31. How was the height when your house inundated the last?

- ☐ 1) < 10 cm
- ☐ 2) 10 cm – 30 cm
- ☐ 3) 330 cm – 50 cm
- ☐ 4) 50 cm – 1 m
- ☐ 5) 1 m – 1.5 m
- ☐ 6) 1.5 m

32. Did you lost any property

- ☐ 1) Yes
- ☐ 0) No

33. How do you estimate the probability of future flood in your house?

- ☐ 1) Very low
- ☐ 2) Low
- ☐ 3) Moderate
- ☐ 4) High
- ☐ 5) Very high

Activities in the Riverside

This section is to know your attitude towards the river

34. Frequency of visiting riverside area

- ☐ 1) Never
- ☐ 2) Uncertain
- ☐ 3) Several time(s) in a month
- ☐ 4) Several time(s) in a week
- ☐ 5) Everyday

35. What kind of activity(ies) you are doing in the riverside?
(you can choose more than one)

- ☐ Walk
- ☐ Sitting/relax
- ☐ Chat
- ☐ Fishing
- ☐ Playing close to water
- ☐ Occasional use (festival, etc)
- ☐ None
- ☐ Other : _____

36. Do you and your family use river water in everyday life?

- ☐ 1) Yes (skip to 18)
- ☐ 0) No (skip to 19)

37. River water usage?

(you can choose more than one)

- ☐ Drink
- ☐ Washing body
- ☐ Washing dishes/clothes
- ☐ Toilet
- ☐ Never use river water
- ☐ Other: _____

Basic Information

In this section, please let us know about yourself

19. Subdistrict

- ☐ Danurejan
- ☐ Gedongtengen
- ☐ Gondokusuman
- ☐ Gondomanan
- ☐ Jetis
- ☐ Kotagede
- ☐ Kraton
- ☐ Mantrijeron
- ☐ Mergangsan
- ☐ Ngampilan
- ☐ Pakualaman
- ☐ Tegalrejo
- ☐ Umbulharjo
- ☐ Wirobrajan

20. Age

- ☐ 1) <20 years old
- ☐ 2) 21 – 30 years old
- ☐ 3) 31 – 40 years old
- ☐ 4) 41 – 50 years old
- ☐ 5) 51 – 60 years old
- ☐ 6) 61 – 70 years old
- ☐ 7) 71 – 80 years old
- ☐ 8) > 80 years old

21. Sex

- ☐ 1) Male
- ☐ 2) Female

22. Marital status

- ☐ 1) Married
- ☐ 2) Single

23. Education

- ☐ 1) None
- ☐ 2) Elementary school
- ☐ 3) Junior high school
- ☐ 4) Senior high school
- ☐ 5) Diploma
- ☐ 6) Bachelor
- ☐ 7) Graduate

24. Occupation

- | | |
|---|------------------------------------|
| ☐ Government officer | ☐ House person |
| ☐ Company employee | ☐ Retired |
| ☐ Self-owned bussines | ☐ Unemployed |
| ☐ Part-time worker | ☐ Other:_____ |
| ☐ Student | |

25. Monthly income of the family (in Indonesia Rupiah)

- ☐ 1) < 500,000
- ☐ 2) 500,000 – 1,000,000
- ☐ 3) 1,000,000 – 1,500,000
- ☐ 4) 1,500,000 – 2,000,000
- ☐ 5) 2,000,000 – 2,500,000
- ☐ 6) 2,500,000 – 3,000,000
- ☐ 7) 3,000,000 – 3,500,000
- ☐ 8) 3,500,000 – 4,000,000
- ☐ 9) 4,000,000

26. How many people living in the same house with you? (including yourself)

27. Among them, how many people is earning income in your household? (including pension income)

28. House ownership

- ☐ 1) Own
- ☐ 0) Rent

29. Total number of year of living in Yogyakarta City

- ☐ 1) < 5 years
- ☐ 2) 6 – 10 years
- ☐ 3) 11 – 15 years
- ☐ 4) 16 – 20 years
- ☐ 5) 21 – 30 years
- ☐ 6) 31 – 40 years
- ☐ 7) 41 – 50 year
- ☐ 8) > 51 years

30. Name of the closest river to your house

- ☐ Winongo
- ☐ Code
- ☐ Gajahwong

31. Distance between your house to the closest river

- ☐ 1) 0 – 50 m
- ☐ 2) 50 – 100 m
- ☐ 3) 100 – 500 m
- ☐ 4) 500 m – 1 km
- ☐ 5) 1 km – 2 km

32. Did you/your family donate for something in a recent year?

- ☐ 1) Yes (*skip to 31*)
- ☐ 0) No (*skip to 32*)

33. What did you do for the donation?

- ☐ Being a donor for charity foundation
- ☐ Donation for disaster
- ☐ Donation for nature preservation
- ☐ Donation for constructing religious building
- ☐ Volunteering in town or neighborhood event
- ☐ Clean up activities
- ☐ Teaching children for free
- ☐ Other: _____

34. Regarding the questionnaire, please let us know if you have any opinions and comments

Signed,

Respondent

Existing

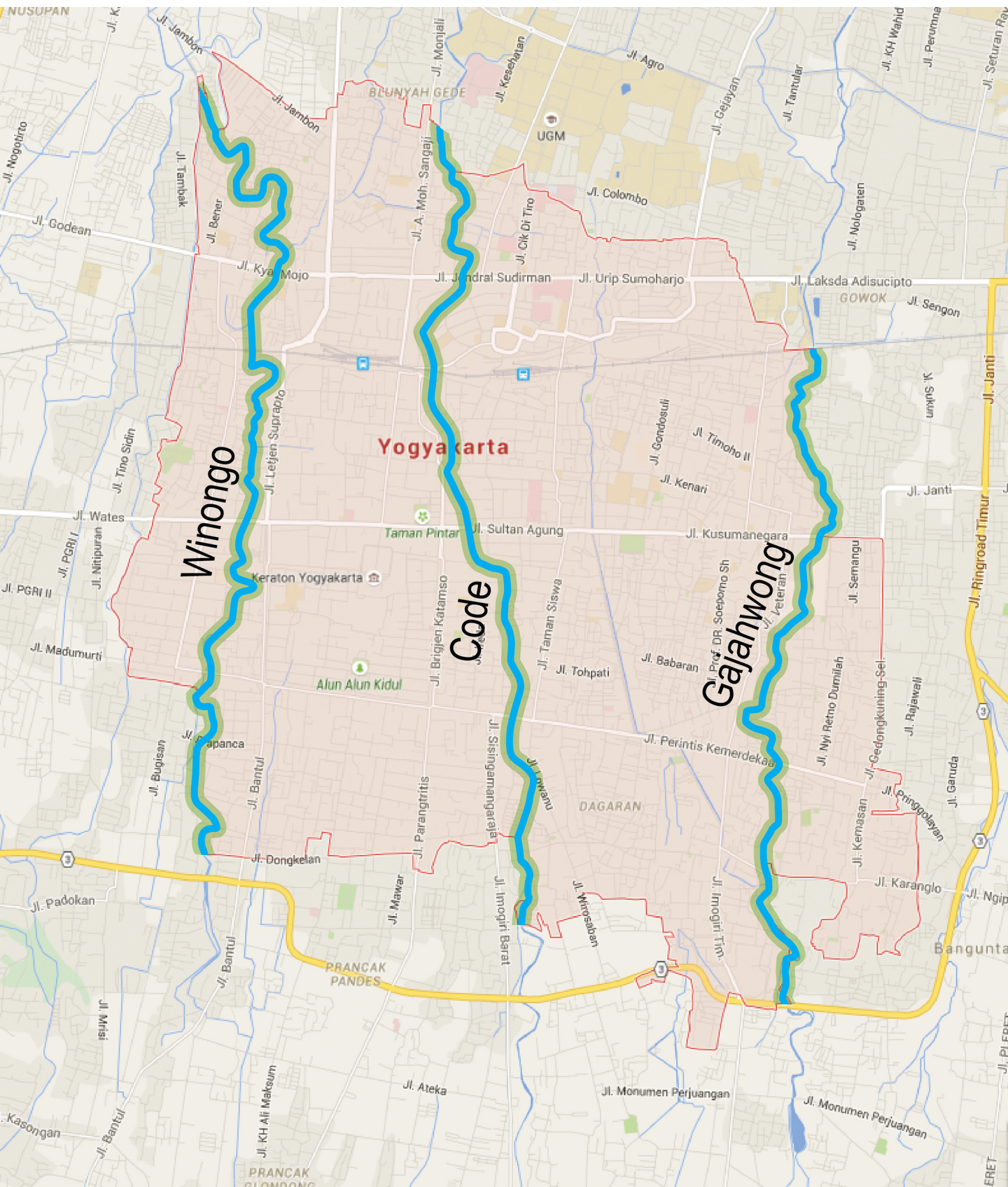


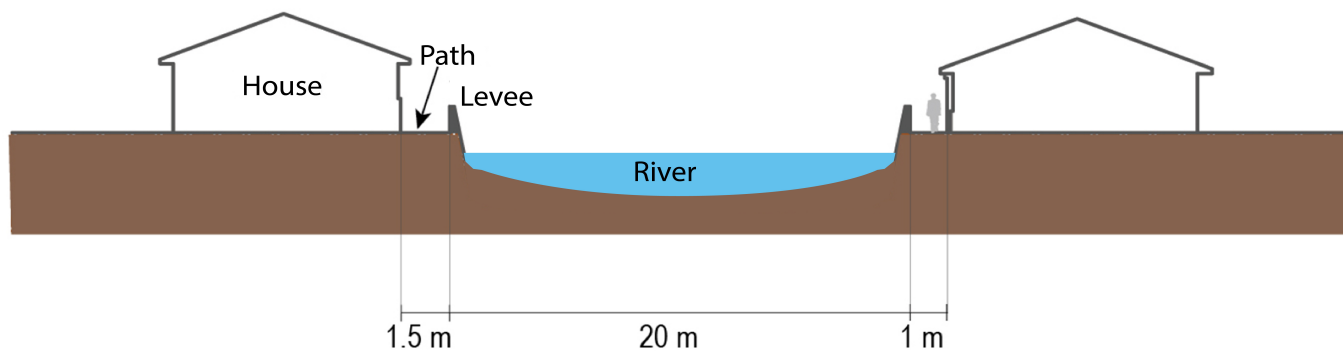
Design

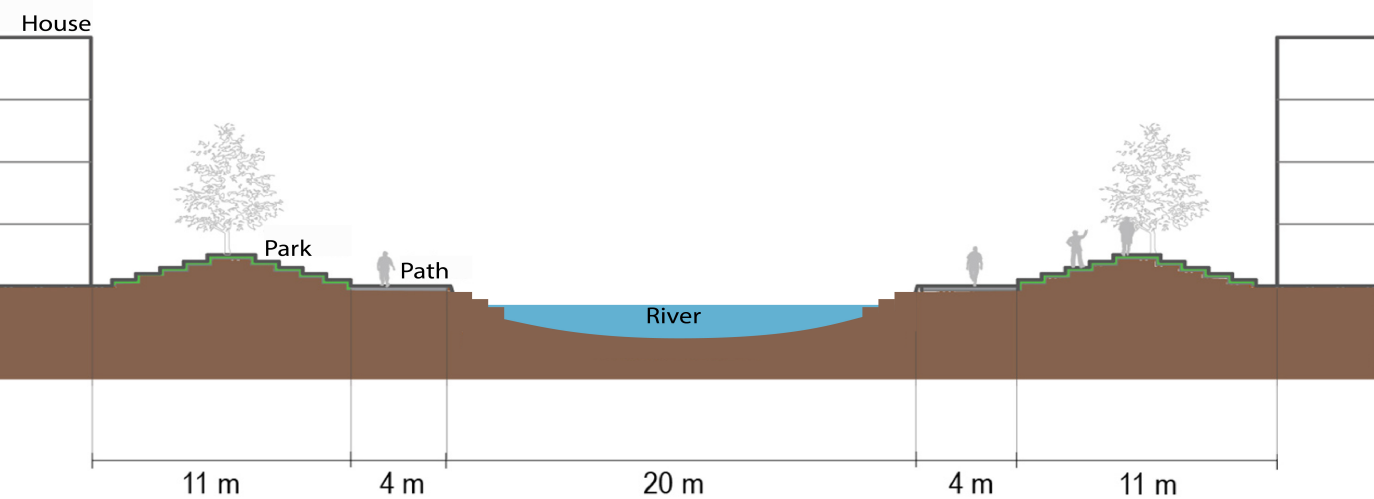




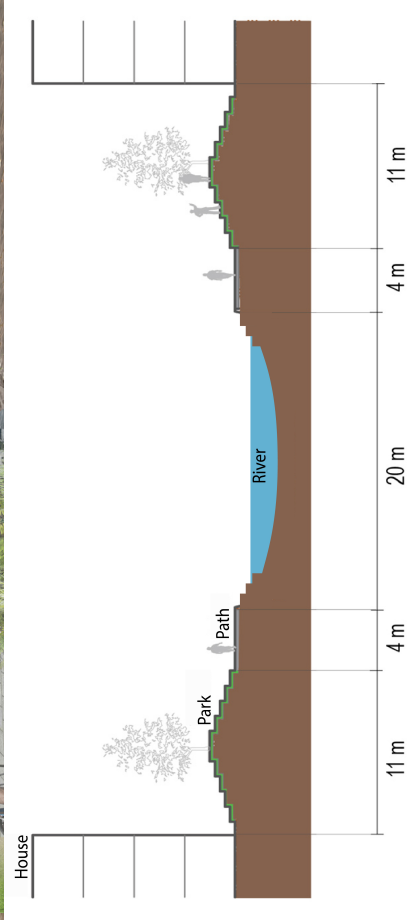
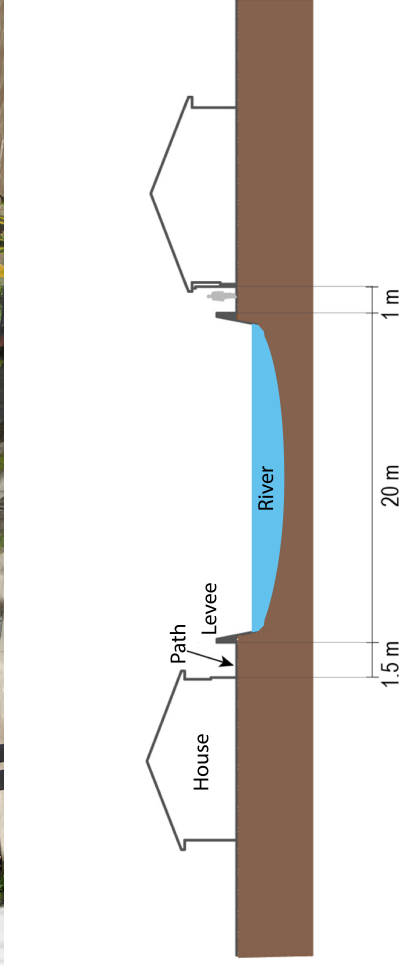
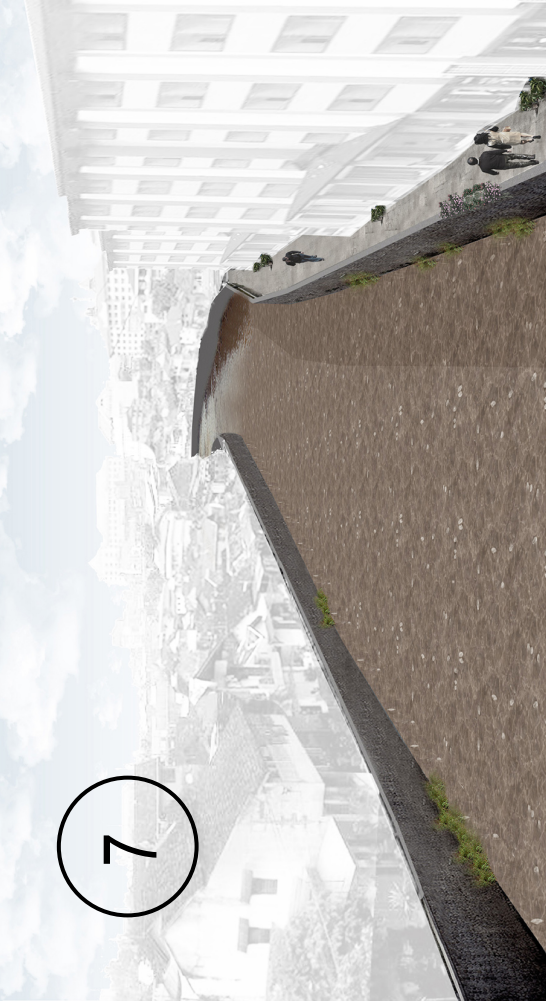






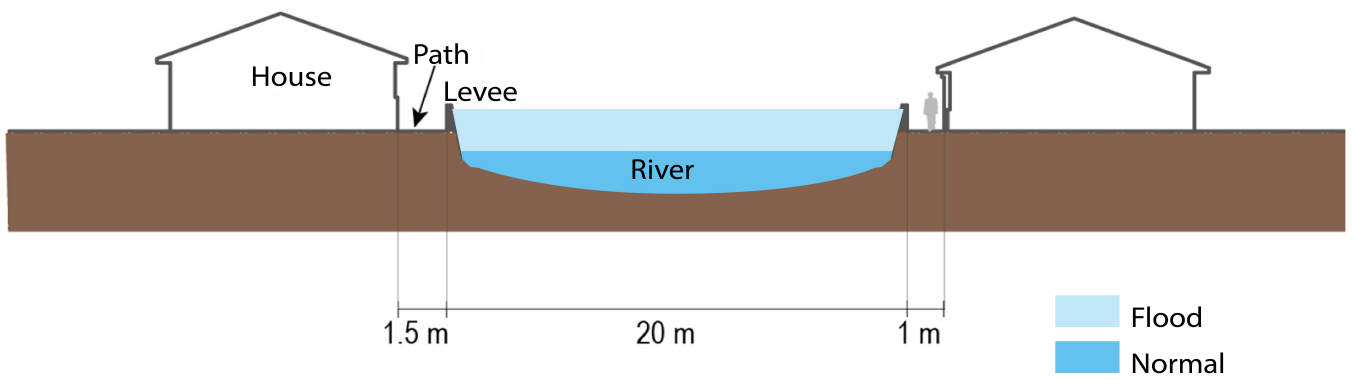


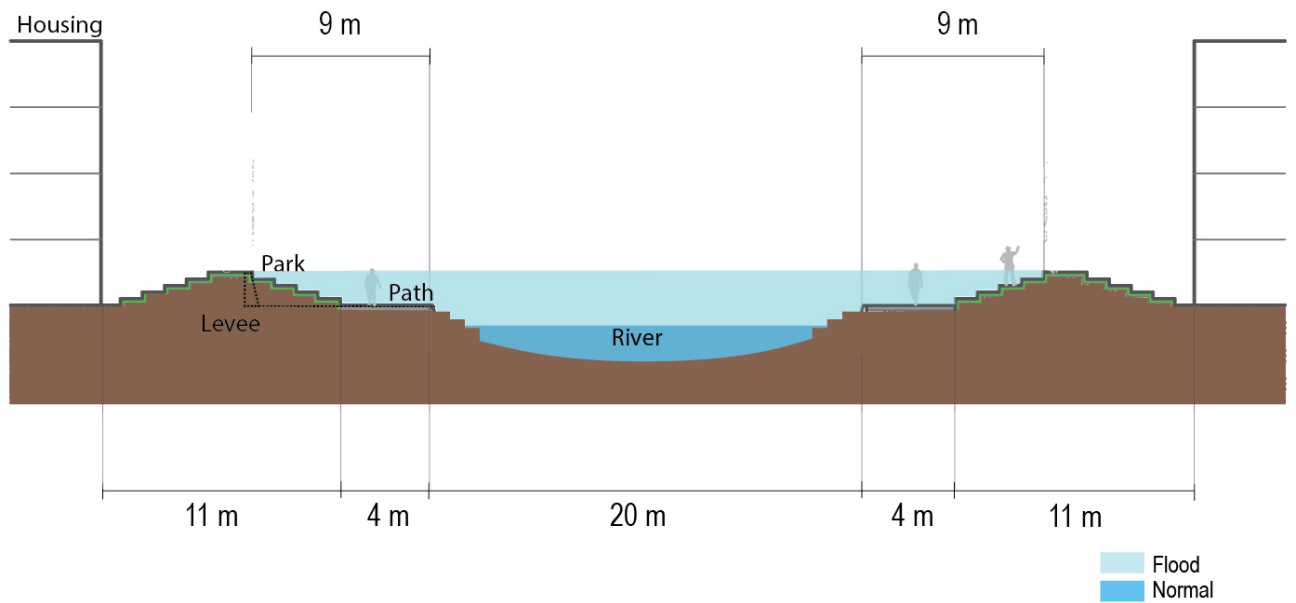
7

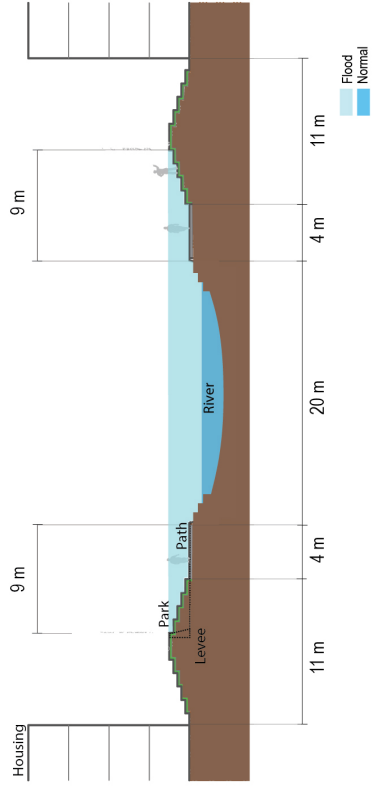
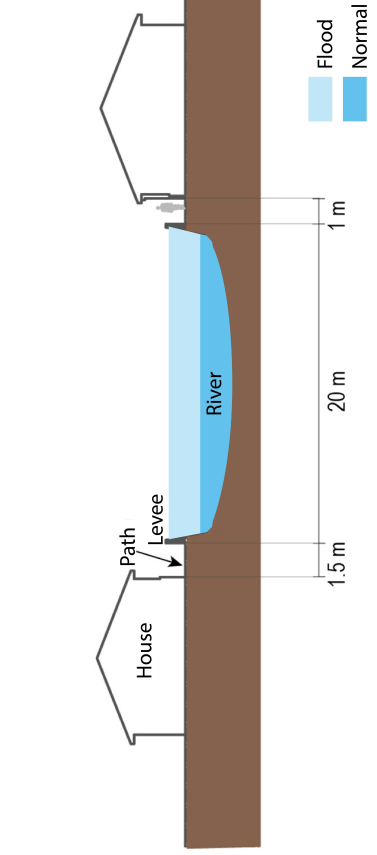
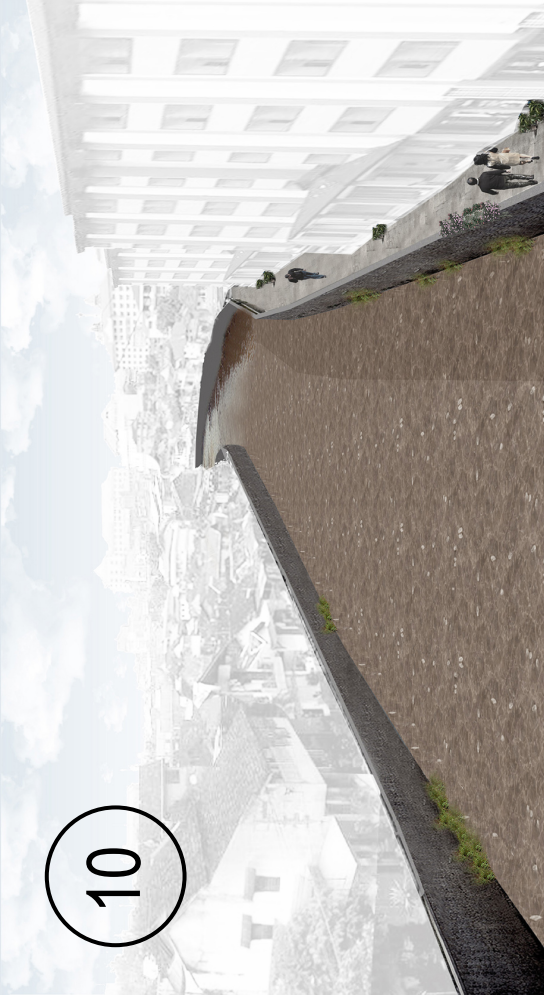


FLOOD EVENT









Questionnaire for research: “Economic Evaluation for Riverside Landscape Design Considering Amenity and Disaster Mitigation, Case Study: Yogyakarta, Indonesia”

This research is performed under the guidance of Laboratory of Urban and Landscape Design, Department of Civil and Earth Resources Engineering, Graduate School of Engineering, Kyoto University – Japan

This research aims to determine citizen's perception about the designs of riverside area in Yogyakarta City. The designs will be examined through valuation of the citizen's impression to the design, in which the value of impression is converted into value of money.

In this research, there is a design of riverside area in Yogyakarta City will be examined.

The questionnaire may take approximately 10 minutes to answer the questions.

This questionnaire is only for people who currently living in Yogyakarta City.

Information in the questionnaire will be for scientific purposes only and will not be used for other than that.

This research will process and analyze your answers statistically, therefore, we will keep your identity anonymous and it will never occur that your personal information is identified.

Please reply the questionnaire as family representative.

Thank you very much for your kind cooperation to fill the questionnaire despite your busy schedule.

Please kindly fill the questionnaire before Sunday, August 1 2nd 2015.

Contact

Researcher : Atrida Hadiani
Phone : +62 817 463129
Email : atridahadiani@gmail.com

Laboratory of Urban and Landscape Design, Department of Civil and Earth Resources Engineering, Graduate School of Engineering, Kyoto University – Japan

There is a design of the riverside area in Yogyakarta City to be examined in this research. The design is an improvement over the existing conditions.



Design Evaluation

Image 1



1. Please imagine that you will do activities in this place, what kind of activities do you think attractive to do in this place?

(you can choose more than one)

Check all that apply.

- ☐ Walk
- ☐ Sit/relax
- ☐ Eat and drink
- ☐ Chat
- ☐ Fishing
- ☐ Play close to water
- ☐ Occasional use
- ☐ Other:

2. In your opinion, the place in the image above is...

(Mark one oval which is mostly representing your opinion towards the image in 1 to 5)

Mark only one oval.

	1	2	3	4	5	
Unattractive	☐	☐	☐	☐	☐	Attractive

3. Mark only one oval.

	1	2	3	4	5	
Artificial	☐	☐	☐	☐	☐	Natural

4. Mark only one oval.

	1	2	3	4	5	
Dirty	☐	☐	☐	☐	☐	Clean

5. Mark only one oval.

	1	2	3	4	5	
Narrow	☐	☐	☐	☐	☐	Spacious

6. Mark only one oval.

	1	2	3	4	5	
Unsafe	☐	☐	☐	☐	☐	Safe

Design Evaluation

Image 2



7. Please imagine that you will do activities in this place, what kind of activities do you think attractive to do in this place?

(you can choose more than one)

Check all that apply.

- ☐ Walk
- ☐ Sit/relax
- ☐ Eat and drink
- ☐ Chat
- ☐ Fishing
- ☐ Play close to water
- ☐ Occasional use
- ☐ Other:

8. In your opinion, the image above is...

(Mark one oval which is mostly representing your opinion towards the image in 1 to 5)

Mark only one oval.

	1	2	3	4	5	
Unattractive	☐	☐	☐	☐	☐	Attractive

9. Mark only one oval.

	1	2	3	4	5	
Artificial	☐	☐	☐	☐	☐	Natural

10. Mark only one oval.

	1	2	3	4	5	
Dirty	☐	☐	☐	☐	☐	Clean

11. Mark only one oval.

	1	2	3	4	5	
Narrow	☐	☐	☐	☐	☐	Spacious

12. Mark only one oval.

	1	2	3	4	5	
Unsafe	☐	☐	☐	☐	☐	Safe

Willingness to Pay

This section aims to examine the value of the riverside landscape design in Yogyakarta City.

There are assumed project of construction will be given, and it is not associated to actual policies or plans.

Suppose there is plan for redevelopment the riverside area in Yogyakarta City to improve the existing landscape.

There is a design proposed to be adapted to the project. Each design has different level of improvement, in terms of appearance and functions.

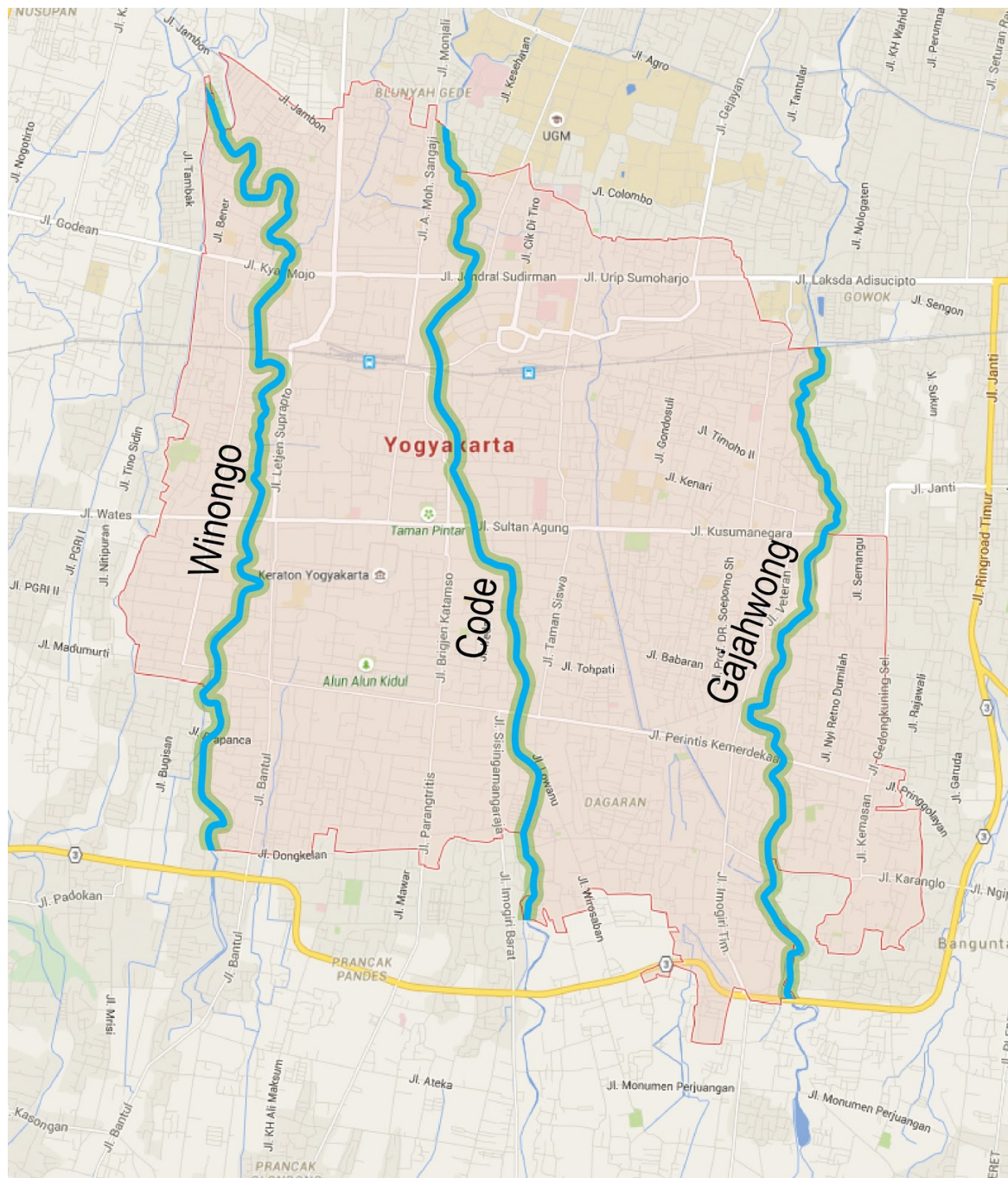
The pictures shown are image of typical scenery of the site.

The design will be applied along the riverside in both 3 (three) main rivers; Winongo, Code, and Gajahwong.

However, in order to execute and maintain the area according to design, it requires large amount of money.

In this case, all households in Yogyakarta City should devote to pay additional tax starting from 2016.

All households living in Yogyakarta City will pay the same amount every year during their living in Yogyakarta City.



Part 1 - Amenity

There are 3 (three) rivers are crossing Yogyakarta City, they are Winongo River, Code River and Gajahwong River.

High density settlements growing along the riverside caused many environmental problems, namely garbage and domestic waste.

Moreover, there is limited public and open green space throughout this area, whereas it supposed to be natural conservation area in order to protect natural ecosystem of the river.

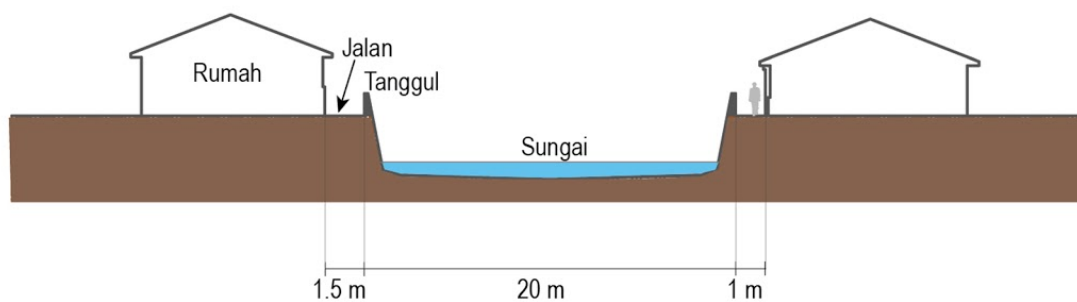
If there is no redevelopment of this area, there will be a significant environmental degradation leading to problems that result in adverse impacts not only to the communities living along the river, but also the people of the city.

Please answer the following questions in the viewpoint of AMENITY of the riverside area.

Please value ONLY the development of the riverside, water quality and buildings is not include in this valuation.

Existing

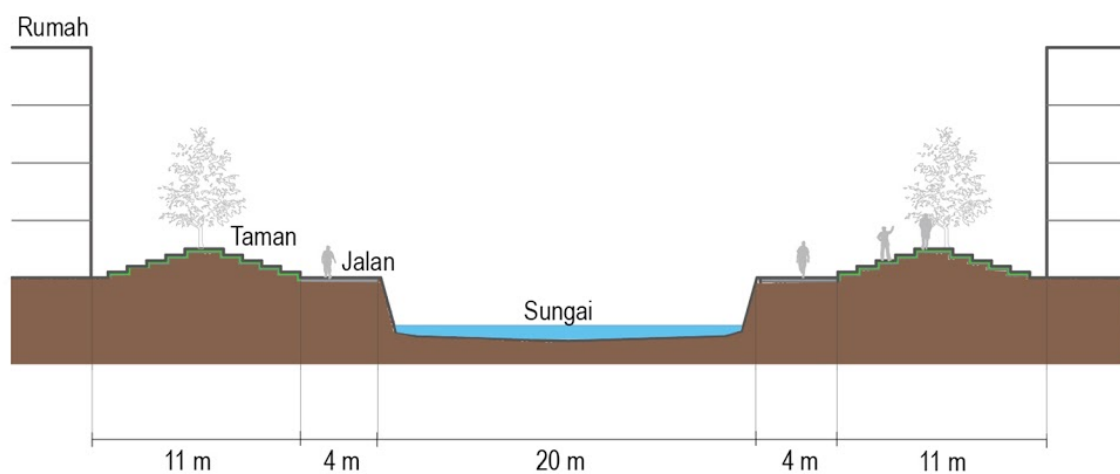
- High density housing that is very close to river mouth
- The settlement grows unplanned and looks dirty
- There is no sufficient green open space



Design

- Distance between housing and river edge is widened to 15 meters, 5 meters used for promenade and the rest 10 meters used for park area
- The park can be utilized as public space for many recreational and outdoor activities, from relaxing, picnic, sports and occasional use (festival, etc).

- The park is also used as natural preservation
- Green open space attached is expected to restore natural ecosystem, reduce air pollution and urban heat island.

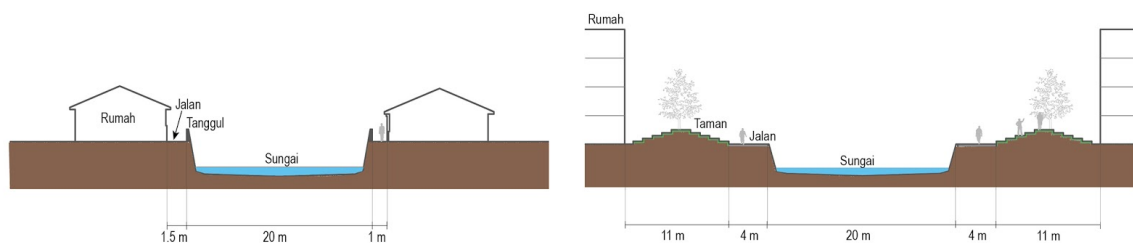


13. **By comparing the image of the Existing and Design as in the image above, do you agree with the project for amenity improvements of the riverside area?**

Please answer the question by consider ONLY the development area (inside the red line), any properties other than the development area, such as building and water, should not be considered.

Mark only one oval.

- ☐ Yes Skip to question 14.
- ☐ No Skip to question 14.



14. **Compare to Existing, how much you can pay for the development of riverside in 3 (three) rivers in Yogyakarta City as additional tax? (in Rupiah)**

Please mind that if the amount of tax is increased, your family income will be decreased.

Mark only one oval.

- ☐ 500 (6,000/year)
- ☐ 1,000 (12,000/year)
- ☐ 2,000 (24,000/year)
- ☐ 5,000 (60,000/year)
- ☐ 10,000 (120,000/year)
- ☐ 20,000 (240,000/year)
- ☐ 30,000 (360,000/year)
- ☐ 40,000 (480,000/year)
- ☐ 50,000 (600,000/year)
- ☐ Other:

21. The design may affect the regional economy and tourism in Yogyakarta City

Mark only one oval.

	1	2	3	4	5	
Very disagree	☐	☐	☐	☐	☐	Strongly agree

22. I want the next generation to have better riverside and use the design

Mark only one oval.

	1	2	3	4	5	
Very disagree	☐	☐	☐	☐	☐	Strongly agree

23. The design enhance the natural and cultural value of the riverside area in Yogyakarta City

Mark only one oval.

	1	2	3	4	5	
Very disagree	☐	☐	☐	☐	☐	Strongly agree

24. I think the design has better building architecture

Mark only one oval.

	1	2	3	4	5	
Very disagree	☐	☐	☐	☐	☐	Strongly agree

Part 2 - Function

There are three main rivers flows crossing Yogyakarta City, namely Winongo, Code and Gajahwong, and both rivers are tipped from Merapi volcano. Merapi volcano produces large number of sediment volumes during the eruption period, which potentially transport to downstream in various mechanisms, among others through natural flow by bed transports and debris flows. The lava flow can occur triggered by rain, which is when rainfall is high during the rainy season, normally from November to April. These lava flows can reach speed between 57 m/s at 1000 meter in elevation. This lava flows is known as cold lava flood or “banjir lahar dingin” in Indonesian language.

This kind of flooding, beside the regular urban or river flooding, might occur in every 4 – 6 years, depend on the volcanic activity. During and after the eruption event, rivers that tipped from Mt. Merapi may carry considerable amount of sediment generated by the volcano and flows with destructive power, among of those rivers Boyong/Code River and Kuning River (in east part of Yogyakarta) have higher potential to get struck by debris flow. The risk of cold lava flow is mainly threatened residents who live along the riverside, because the flow of cold lava can flooded neighborhoods, destroyed houses and buried all in the sand. Area within 20 meters from river edge is highly prone to this hazard.

There are several flooding events recorded in rivers in Yogyakarta due to debris flow within the last 25 years. The last Merapi eruption event in 2010 lead to massive sediment flow that cause flooding that reach 1.5 meters height in some riverbank and inundated more than 300 houses. Water and debris inundated the settlements 50 meter from the riverbank with depth of 1.25 meter, this event caused 800 residents evacuated.



Pictures above are sample of damage area affected by flooding. Other riverside areas has similar risk to flooding.

Therefore, with the aim of protecting the community from disasters and enhance the environment quality in the riverside, the redevelopment is necessary.

There are 2 (two) designs proposed to improve safety in riverside area, each design has different level of protection to flooding.

Ecological and water quality remain the same as before the redevelopment.

Please answer the following questions in the viewpoint of SAFETY of riverside area.

Please value ONLY the development of the riverside, water quality and buildings is not include in this valuation.

Source of images:

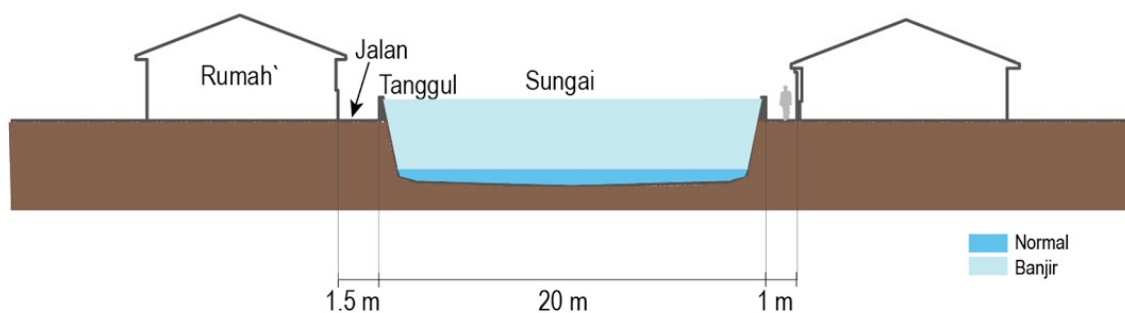
Above : <http://www.jongjava.com/>

Left : <http://static.republika.co.id/>

Right : <http://sorotjogja.com/>

Existing

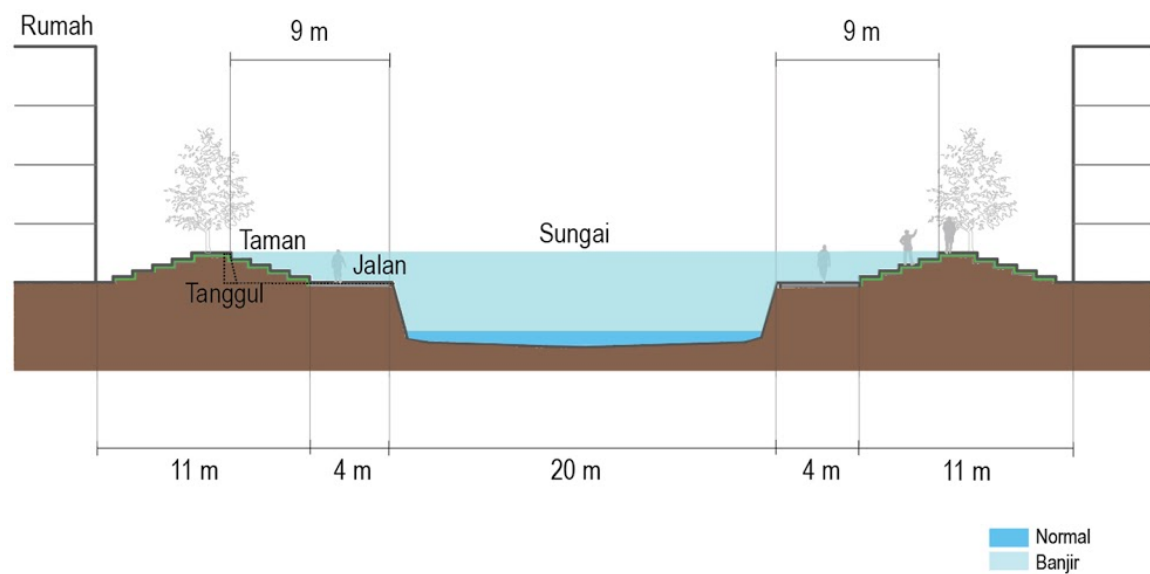
- Area within 1 – 1.5 meter from river edge
- Able to withstand 50 cm flood depth (by height, not by strength)
- If overflow occur, area behind the floodwall is highly risk to inundation



Design

- Area within 15 – 20 meter from river edge
- Settlements is relocated into vertical housing and located behind the structure in order to reduce horizontal density, thus the land can be used for green open space in between the housing building
- Able to protect from the damage that caused by flooding with discharge of 100 year return period*.

*100 year return period means the chance of occurrence is 1% in any given year

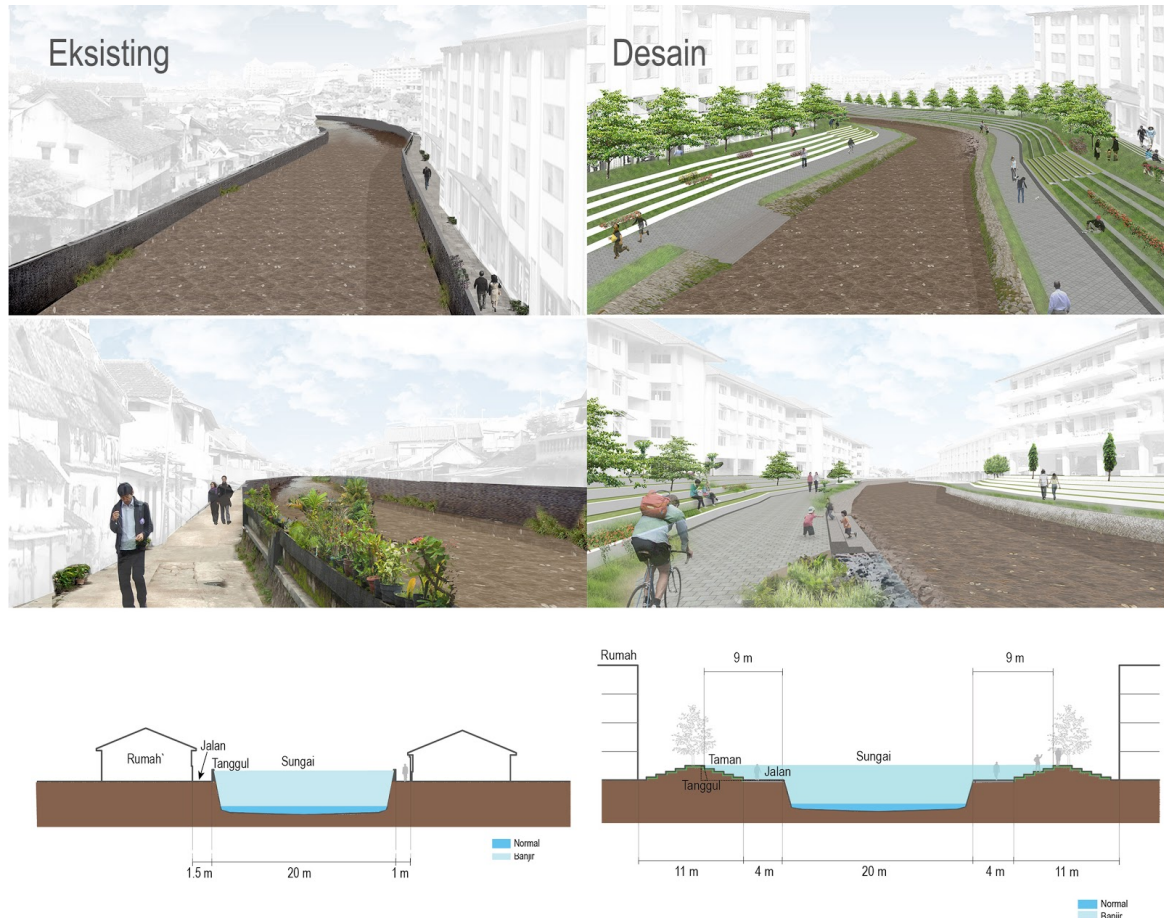


25. By comparing the image of the Existing and Design as in the image above, do you agree with the project for safety improvements of the riverside area?

Please answer the question by consider ONLY the development area (inside the red line), any properties other than the development area, such as building and water, should not be considered.

Mark only one oval.

- ☐ Yes Skip to question 26.
- ☐ No Skip to question 26.



26. Compare to Existing, how much you can pay for the development of riverside in 3 (three) rivers in Yogyakarta City as additional tax? Please answer the amount including AMENITY aspect (Price = Amenity + Safety) (in Rupiah)

Please mind that if the amount of tax is increased, your family income will be decreased.

Mark only one oval.

- ☐ 500 (6,000/year)
- ☐ 1,000 (12,000/year)
- ☐ 2,000 (24,000/year)
- ☐ 5,000 (60,000/year)
- ☐ 10,000 (120,000/year)
- ☐ 20,000 (240,000/year)
- ☐ 30,000 (360,000/year)
- ☐ 40,000 (480,000/year)
- ☐ 50,000 (600,000/year)
- ☐ Other:

33. The proposed design may affect the regional economy and tourism in Yogyakarta City

Mark only one oval.

	1	2	3	4	5	
Very disagree	☐	☐	☐	☐	☐	Strongly agree

34. I want the next generation to have better riverside and use the design

Mark only one oval.

	1	2	3	4	5	
Very disagree	☐	☐	☐	☐	☐	Strongly agree

35. The design enhance the natural and cultural value to the riverside area in Yogyakarta City

Mark only one oval.

	1	2	3	4	5	
Very disagree	☐	☐	☐	☐	☐	Strongly agree

36. I think the design improves water quality of the river

Mark only one oval.

	1	2	3	4	5	
Very disagree	☐	☐	☐	☐	☐	Strongly agree

Disaster Risk

This section is to know your understanding about the risk

37. Have you experience river floods?

Mark only one oval.

☐ Yes *Skip to question 40.*

☐ No

38. How was the height when your house inundated the last?

Mark only one oval.

☐ < 10 cm

☐ 10 cm - 30 cm

☐ 30 cm - 50 cm

☐ 50 cm - 1 m

☐ 1 m - 1.5 m

☐ > 1.5 m

39. Did you lost any property due to flooding?

Mark only one oval.

- ☐ Yes
- ☐ No

40. How do you estimate the probability of future flood in your house?

Mark only one oval.

- ☐ Very high
- ☐ High
- ☐ Moderate
- ☐ Low
- ☐ Very low

Activities in the Riverside

This section is to know your attitude toward the river

41. Frequency of visiting riverside area

Mark only one oval.

- ☐ Every day
- ☐ Once/several times in a week
- ☐ Once/several times in a month
- ☐ Uncertain
- ☐ Never

42. What kind of activity(ies) you are doing in the riverside?

(you can choose more than one)

Check all that apply.

- ☐ Walk
- ☐ Sit/relax
- ☐ Chat
- ☐ Fishing
- ☐ Play close to water
- ☐ Occasional use (festival, etc)
- ☐ None
- ☐ Other:

43. How do you use river water?

(you can choose more than one)

Check all that apply.

- ☐ Drink
- ☐ Washing body
- ☐ Washing dishes/clothes
- ☐ Toilet
- ☐ Never use river water
- ☐ Other:

Basic Information

In this section, please let us know about yourself

44. Subdistrict

Please choose the subdistrict of your residence

Mark only one oval.

- ☐ Danurejan
- ☐ Gedongtengen
- ☐ Gondokusuman
- ☐ Gondomanan
- ☐ Jetis
- ☐ Kotagede
- ☐ Kraton
- ☐ Mantrijeron
- ☐ Mergangsan
- ☐ Ngampilan
- ☐ Pakualaman
- ☐ Tegalrejo
- ☐ Umbulharjo
- ☐ Wirobrajan

45. Age

Mark only one oval.

- ☐ < 20 years old
- ☐ 21 - 30 years old
- ☐ 31 - 40 years old
- ☐ 41 - 50 years old
- ☐ 51 - 60 years old
- ☐ 61 - 70 years old
- ☐ 71 - 80 years old
- ☐ > 80 years old

46. Marital status

Mark only one oval.

- ☐ Married
- ☐ Single

47. Education

Mark only one oval.

- ☐ None
- ☐ Elementary school
- ☐ Junior high school
- ☐ Sekolah Menengah Atas
- ☐ Diploma
- ☐ Bachelor
- ☐ Graduate

48. Occupation

Mark only one oval.

- ☐ Government officer
- ☐ Company employee
- ☐ Self-owned business
- ☐ Part-time worker
- ☐ Student
- ☐ House person
- ☐ Retired
- ☐ Unemployed
- ☐ Other:

49. Monthly income of the household

(in IDR)

Mark only one oval.

- ☐ < 500,000
- ☐ 500,000 - 1,000,000
- ☐ 1,000,000 - 1,500,000
- ☐ 1,500,000 - 2,000,000
- ☐ 2,000,000 - 2,500,000
- ☐ 2,500,000 - 3,000,000
- ☐ 3,000,000 - 3,500,000
- ☐ 3,500,000 - 4,000,000
- ☐ > 4,000,000

50. How many people living in the same house with you?

(including yourself)

51. Among them, how many people is earning income in your household?

(including pension income))

52. House ownership

Mark only one oval.

☐ Owned

☐ Rent

53. Total number of year of living in Yogyakarta City

Mark only one oval.

☐ < 5 years

☐ 6 - 10 years

☐ 11 - 15 years

☐ 16 - 20 years

☐ 21 - 30 years

☐ 31 - 40 years

☐ 41 - 50 years

☐ > 51 years

54. Name of the closest river to your house

Mark only one oval.

☐ Winongo

☐ Code

☐ Gajahwong

55. Distance between your house to the closest river

Mark only one oval.

☐ 0 – 50 m

☐ 50 - 100 m

☐ 100 m – 500 m

☐ 500 m – 1 km

☐ 1 km – 2 km

56. **Did you/your family donate for something in a recent year?**

Mark only one oval.

☐ Yes *Skip to question 57.*

☐ No *Skip to question 58.*

57. **What did you do for the donation?**

Check all that apply.

☐ Being donor for charity foundation

☐ Donation for disaster

☐ Donation for nature preservation

☐ Donation for constructing religious building

☐ Clean up activities in the neighborhood

☐ Teaching children for free

☐ Other:

58. **Regarding the questionnaire, please let us know if you have any opinions and comments**

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